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The Physiotherapy Review

Vol. XI No. 2

Table of Contents

	Page
Education in Physical Therapy. *Irving S. Cutter, M.D.*	38
The Value of Physical Therapy in Peripheral Vascular Diseases. *Geza de Takats, M.D., M.S., F.A.C.S.*	39
Sympathectomy for Peripheral Vascular Diseases. *Alfred W. Adson, M.D.*	42
Early Treatment of the More Common Congenital Deformities. *Robert V. Funston, M.D.*	43
The Treatment of Some Neurological Conditions by Physiotherapy. *F. G. Lindemulder, M.D.*	45
A New Method of Producing Fever: The Treatment of General Paresis. *Clarence A. Neymann, A.B., M.D.* and *Stafford L. Osborne, B.P.E.*	47
Paralysis of the Shoulder Muscles Following Acute Anterior Poliomyelitis. *Daniel H. Levinthal, M.D., F.A.C.S.*	51
The Importance of a Rehabilitation Program in Medical Education. *John S. Coulter, M.D.*, and *Charlotte M. Morrison, B.S.*	54
History of Physical Therapeutics. *Frank Hammond Krusen, M.D.*	57
Editorials	62
A Regime of the Physical Care of Dowling School Children. *Helen S. Foss* and *Harriet B. Gass*	66
The Gillette State Hospital for Crippled Children. *Marian Denny*	68
The Chicago Public Schools' Experiment in the Education of the "Spastic Child." *Mabel C. Smart*	69
Recreation for the Physically Handicapped. *Verne Marie Miller*	72
Nerve Injuries. *F. Crooks, M.Ch., F.R.C.S., Eng.*	74
Index to Current Literature on Physical Therapy	77
Abstracts. *John S. Coulter, M.D.*	79

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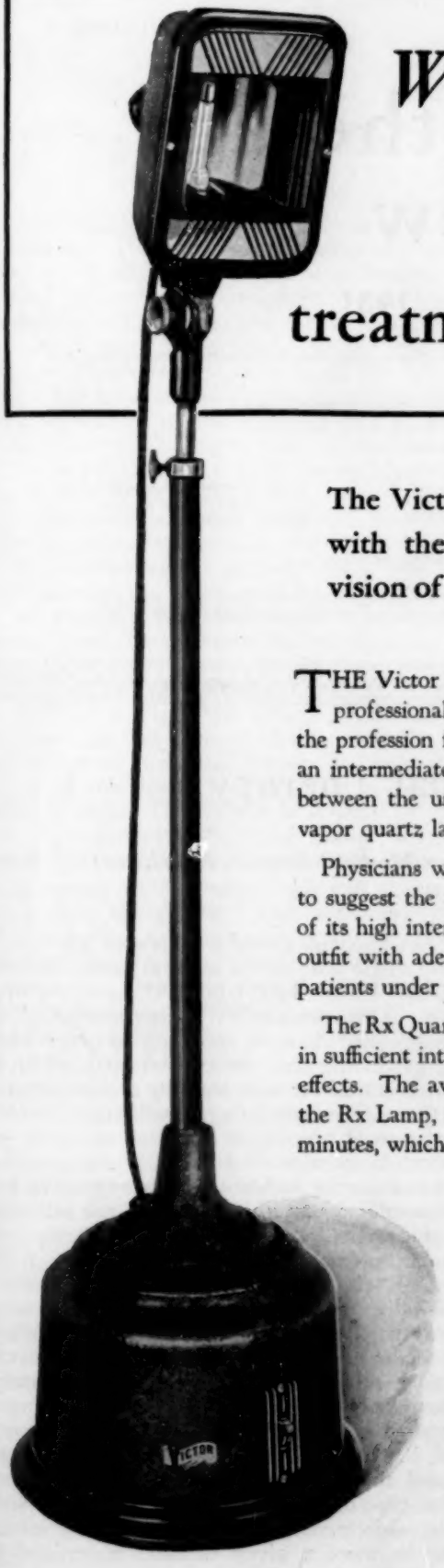

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Education in Physical Therapy

By Irving S. Cutter, Associate Professor of Medicine, Dean Medical School, Northwestern University

The essential use of physical therapy as well as the application of various physical therapeutic measures supplementing surgery are so little known as to indicate the need of a wide-spread dissemination of accurate information on this topic.

Northwestern University Medical School some several years ago, sensing the importance of this little known field began an intensive study of the scientific application of physical therapy as well as the educational problems involved. As the problem cleared in perspective the importance of the subject was definitely recognized and the medical faculty attempted to do two things:

I. Develop a department in which teaching could be carried on looking toward the training of undergraduate students, technicians and graduate physicians.

II. The training of a group of young women in such fundamental courses involving anatomy, physiology, pathology, psychology, etc., as would basically prepare them for the application of technical therapeutic measures.

The functions indicated under the first paragraph have been carried on for some three or four years, with definite value to the students concerned and with considerable gratification to the faculty.

To function under paragraph two it was necessary that the faculty offer a substantial and comprehensive course which should be offered by correlative departments who visualized the objectives and who were completely in sympathy with the end sought. As a result a thorough and comprehensive course involving a total of 1200 hours has been planned and offered. These 1200 hours make up a course somewhat larger in amount than any single year of the medical curriculum and fully as difficult. Of the 1200 hours, 300 alone are devoted to anatomy. This comparatively large amount of time has been determined upon as necessary in order that a substantial grounding shall be secured upon which to build later instruction in muscle training and muscle re-education. Courses in physiology, pathology, biochemistry, biophysics must necessarily be based upon the students' antecedent knowledge of preparatory or ancillary subjects, but must be sufficiently comprehensive to enable persons applying physical therapy to use intelligence instead of functioning as persons who merely switch an electric current on and off.

Hospitals should not be content with superficially trained individuals entrusting to them the management of apparatus that may in unskilled hands prove dangerous, and educational institutions the country over should as far as possible recognize the need and through a carefully correlated course afford adequate training to suitable candidates. The apprentice system, of course, can be used, but this should take a minimum of two or three years and the resulting product could hardly compare with that type of individual who has accurate knowledge of basic subjects. In the launching of any new plan of training to meet a given demand superficial training though short cuts are bound to be sought. It would be far better for medicine and for the patient if the ground work of applied physics could be even a little slower but sound educationally.

The Value of Physical Therapy in Peripheral Vascular Diseases

By Geza de Takats, M.D., M.S., F.A.C.S.

Peripheral vascular diseases have only recently aroused general interest. This is astonishing when one considers how much work and attention has been focused on the heart. And yet the role of peripheral circulation which brings nutrition to the tissues and carries away the waste products is of great importance. When the arterial channels are obstructed, the viability of the part is endangered. Any measure which will open up existing or favor the formation of new channels will be of great help. The object of this paper is to evaluate the present methods of physical therapy from the standpoint of increasing blood-flow in vascular occlusions.

Briefly there are two main groups of arterial occlusion, namely, organic and spastic. In organic occlusions, the artery is completely or partially obliterated because of calcareous deposits in its wall, as in arteriosclerotic vessels, or because of an inflammatory process, which proliferates from the wall into the vessel, as in thromboangiitis obliterans, commonly called Buerger's disease. Both of these processes, arteriosclerosis and Buerger's disease, start with a gradual narrowing of the vessels but also favor the formation of clots because the current of blood is slowed down and because the uneven rough projections of the vessel wall serve as nucleus to the formation of clots. In addition it is possible, that the blood of these patients is actually thicker, an opinion, which dates far back in the history of medicine.

The narrowing of the vessel wall and the clot may completely close the artery. And yet nature has developed a protective mechanism in *collateral circulation.* Small hitherto insignificant vessels open up above the site of obstruction and carry the blood to the periphery. The minute vessels and capillaries also open up and show a great amount of relaxation thus offering minimal resistance to the inflow of blood.

The development of adequate collateral circulation takes time. When a large vessel, such as the popliteal is suddenly tied, because of an injury or suddenly obstructed by a clot which broke lose from the heart, the leg becames gangrenous. However, when the occlusion is gradual, as for instance in Buerger's disease, a collateral circulation will develop, more rapidly in the younger, more slowly in the older individual. The young patient afflicted with Buerger's disease has a far better chance to develop collateral circulation than the older, arteriosclerotic. It is also possible, that these new channels will sooner or later be affected in the same way as the original ones. Thus there is a continuous battle between the increasing occlusion and the development of collateral vessels. The fate of the limb will depend on the outcome of this battle.

It is obvious, and will be later taken up in detail, that the aim of physiotherapy in this group of diseases is to help the formation of collateral channels, thus hastening and favoring nature's own remedy for obstructed circulation.

The second group of vascular occlusions are *spastic.* There is no change in the texture of the vessel wall; but the smaller arteries, particularly those of the fingers and toes contract to such an extent, that blood flow is entirely or almost entirely interrupted. Such spasms occur as a result of exposure to cold, or following emotional upsets. Their mechanism is under dispute. Some think, that abnormal nervous impulses reach the muscles of the arteries and constrict them. This is certainly true of the type of vascular disturbances, occurring in the presence of cervical ribs. Others believe that local chemical changes in the tissues are responsible for the abnormal constriction of such vessels. Be that as it may, the object of any therapeutic measure is to bring about a relaxation of the vessel spasm or to prevent if possible a reoccurrence. If the vessel spasms are frequent and their duration can not be terminated, a gangrene of the tips of the digits will be the result.

The two types of vascular occlusion, organic and spastic, are often found together in the same individual. In Buerger's disease for instance, while the main vessels are occluded by thrombi, a greater or lesser amount of superimposed spasm exists and the recognition of the spastic element is important. The physician will want to know, how much of the circulatory embarrassment is due to the plugging up of the vessel, and how much to constriction. Even in old arteriosclerotics, there is a certain spastic element, which is amenable to physical therapy.

The pathological processes described under these two headings show clearly the object of physical therapy. In the first group, the diseased, plugged vessels can hardly be influenced. But nature's own remedy, the development of collateral circulation, can be efficiently supported. The use of alternate baths for five minutes three times a day, seems helpful to many patients. Half a minute in water of 40° Fahrenheit, half a minute in water of 104°, combined with elevation of the limb and other simple circulatory exercises, may be carried out at home or even at work. Of course if the skin of the patient is not intact, or a frank gangrene is present, the baths are not indicated. Nor are the baths advisable in the presence of localized or spreading infection. The use of continuous heat during the night may be accomplished with the help of electric bakers, special care being taken not to burn the patient's skin. A bath thermometer is convenient in checking the air temperature under the hood, which should not exceed 110° Fahrenheit. The Department of Physical Therapy under Dr. John S. Coulter's direction has instituted an admirable service of renting poorer patients simple electric bakers, which they use at home for several weeks or months. When the patient's skin is dry and scaly or insensitive because of the sensory disturbance accompanying the diminished blood supply, such bakers are better not given out but should be substituted with electric pads or hot water bottles, under constant medical or nursing supervision.

The use of lumbar diathermy, using a current of about 1000 to 1500 milliampères for twenty minutes was found to warm up the skin of the lower extremities considerably. Through the cooperation of the Depart-

Table VII 10/25/29

PERIPHERAL CIRCULATION RECORD

Name Frank McD. Age 54 Diagnosis Varicose Veins
Varicose Ulcer
Peripheral Arteriosclerosis

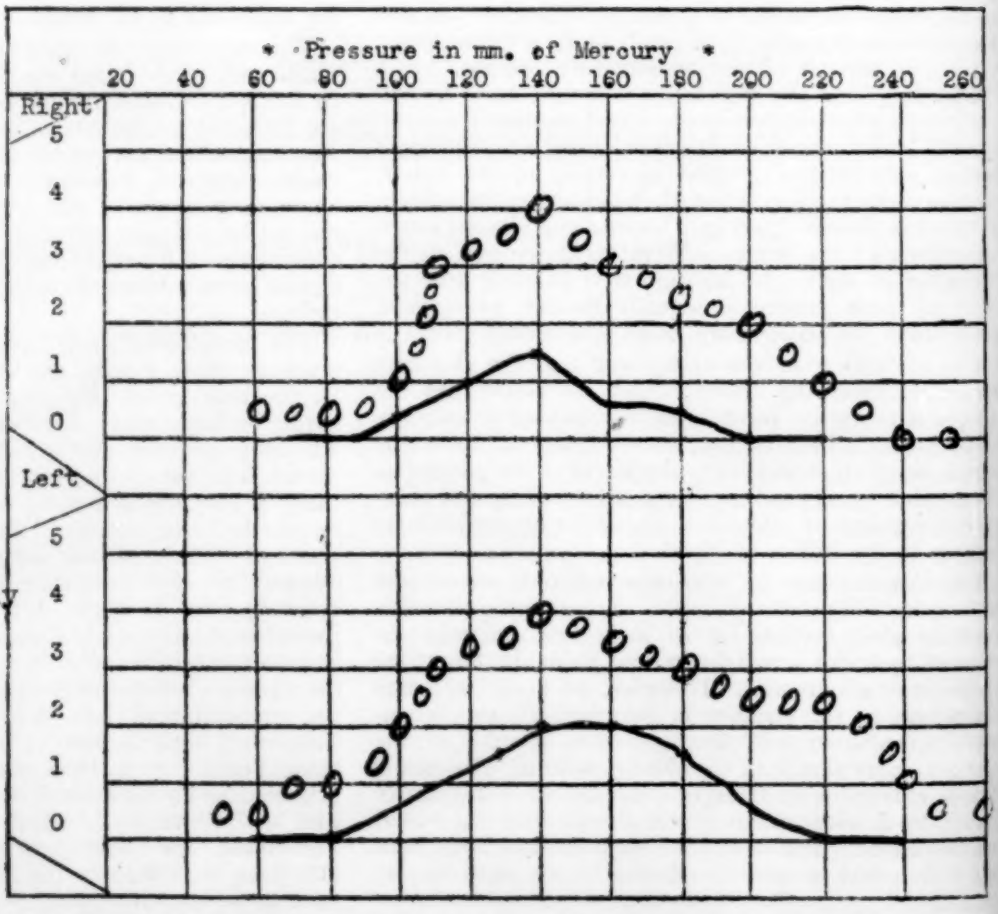
Temperature Sudden drop at both ankles

Postural Changes of Color None

Pulse	Right	Left
Popliteal	3	3
Post tibial	1	1
Dorsalis pedis	?	1

Histamine Test on basis of 0 to 3	Right	Left
Above Knee	3	3
Below Knee	3	3
Middle of Calf	2	2
Ankle	0	1

Oscillometer



Other Findings

Vasomotor index 2

Novocaine block 1-5

Hot water slightly increases oscillations

Resume Beginning impairment of circulation, more on right as shown by both the histamine test and the oscillometer. Tests for superimposed spasm reveal that the obstruction is mainly organic.

---

ment of Physical Therapy, the Peripheral Circulatory Clinic of Northwestern University Medical School has been able to observe subjective and objective improvement in peripheral organic occlusions of the arteries. Not only do patients ask for further treatments, but our circulatory tests indicate an improvement in collateral circulation. Such a circulatory record is shown in Table 1. When patients are submitted to such an examina-

tion at regular intervals an improvement, standstill or turn for the worse can be objectively demonstrated. The diathermy of the cervical region in lesions of the upper extremities would probably offer the same possibilities, but has not yet been tried. One advantage of applying the electrodes at a distance from the area of impaired circulation, is that normal skin is used for making the contacts and the possibility of burns thus minimized. Also much larger areas of the vascular system can be thus included.

In the spastic occlusions, the object of physical therapy is to relieve the spasm. Heat in any form, such as hot baths, electric pads, diathermy will accomplish much. This temporary relief, however, is not of curative value, as the patient under ordinary working conditions will experience further attacks. Some of these cold hands and feet have a definite endocrine origin, others can be traced to mechanical irritation of sympathetic nerves as in cervical ribs or spina bifida, again others are due to reflectoric spasm originating in injured nerves, and must be dealt with accordingly. There is one type of vessel spasm, which seems to be due to a hypersensitivity to cold, very much like there is a hypersensitivity to food or pollens. In such patients baths with slowly diminishing temperature, gradually result in a better tolerance to cold. One young woman, who developed white, dead fingers, at water of 70 degrees Fahrenheit, could finally stand a temperature of 40 degrees without blanching.

There are many other interesting possibilities in connection with physical therapy, but this spastic group is yet poorly understood and further work is necessary to elucidate its various causes. In the treatment of peripheral vascular disorders, we rely heavily on physical therapy. I have of course not dealt with other forms of treatment, such as the foreign protein therapy, the alcohol injections into peripheral nerves, lumbar and cervical sympathectomy and some others. It is obvious, that physical therapy not alone but in conjunction with other measures, is a most powerful weapon to increase blood flow by two of the most ancient therapeutic procedures, namely *heat* and *exercise*.

Sympathectomy for Peripheral Vascular Diseases

By Alfred W. Adson, M.D., Section of Neurosurgery, The Mayo Clinic, Rochester, Minn.

Sympathectomy is a surgical procedure employed in the treatment of Raynaud's disease, thrombo-angiitis obliterans, scleroderma of the extremities, face and neck, and arthritis of the vasomotor type affecting the peripheral joints of the hands and feet. It consists of sectioning rami, sympathetic ganglia and trunks in order to interrupt central impulses of vasoconstriction. The technic is based on the problem involved, and must be planned and carried out so as to interrupt the sympathetic fibers which carry the central impulses to the arteries of the area under treatment. These central impulses originate in the subthalamic area of the brain and are carried over nerve pathways through the mid-brain, medulla, and spinal cord to communicate with cells in the lateral aspect of the anterior horn of the spinal cord which send off white rami communicantes to the sympathetic ganglia which lie on each side of the vertebrae. The efferent impulses are, therefore, disseminated over fourteen pairs of white rami, corresponding to all of the thoracic nerves and the upper two lumbar nerves. From these ganglia the impulses are carried further by grey rami communicantes to other ganglia or to peripheral nerves which distribute the sympathetic fibers to the arteries similar to the musculocutaneous distribution of spinal nerves. Sympathetic fibers are likewise distributed to the visceral organs, sweat glands, and pilomotor muscles but inasmuch as these remarks are confined to diseases of peripheral vascular origin, visceral disturbance will not be considered further. The fibres to the sweat glands and pilomotor muscles are intermingled with the vasoconstrictor fibers so naturally they will be sectioned when resecting sympathetic fibers to the arteries.

The object of sympathectomy is to relieve vasomotor spasm and I have learned that if properly performed the peripheral arteries can be increased in size from one-third to one-half again the size previous to operation. This affects a tremendous increase of blood flow which improves metabolism and elimination, brings about a restitution of tissue destruction and, therefore, becomes a valuable surgical procedure in the treatment of peripheral vascular diseases.

Raynaud's disease is a vasomotor disturbance of the nonocclusive type characterized by asphyxia and cyanosis associated with pain, numbness and ulceration of the fingers and toes. It is obvious that operation is not indicated in the milder type nor is it indicated in that type which responds to medical treatment and physiotherapy, but that it is indicated when pain persists, ulcerations appear and when the patient is incapacitated from work by the disease.

Thrombo-angiitis obliterans is a disease characterized by thrombosis of both arteries and veins which produces muscular and arthritic pains in conjunction with edema and gangrene of digits. Although the operation does not alter the thrombotic process it is capable of relieving vasomotor spasm in collateral arteries, which often is sufficient to relieve the pain, hasten the healing of ulcers and conserve the extremities.

Scleroderma of the acral type affecting the skin of the extremities, face and neck results from an inadequate blood supply of the skin due to vasomotor disturbance and excessive narrowing of the smaller arteries. This, likewise, can be relieved in the early stages by improving the circulation, but again the advanced cases are unsuitable for operation when most of the arteries have been destroyed by fibrosis.

Polyarthritis.—Sympathectomy is indicated in a very small group of patients with arthritis which is due to vasomotor disturbance affecting chiefly the joints of the fingers, hands, wrists, toes, feet and ankles and is characterized by cold clammy extremities. It is not indicated in infectious, traumatic or senescent arthritis or when the larger joints are involved. It is only of value for this selected group of patients who are temporarily relieved by some form of heat, inasmuch as sympathectomy results in vasodilatation, increased blood flow, increased metabolism and increase of elimination.

Early Treatment of the More Common Congenital Deformities

By Robert V. Funston, M.D., of the Orthopedic Department of Harper Hospital and the Children's Hospital of Michigan, Detroit, Mich.

There are certain types of congenital deformities which we consider the ordinary "garden variety." These are: wry neck, birth palsy, congenital dislocation of the hip, congenital club foot, and the opposite, congenital calcaneo-cavo-valgus.

It is only a comparatively short time ago when the generally accepted method of attack in most congenital deformities was to await the time when the child was "old enough" to tolerate the correction. The viewpoint has changed radically. It has now reached the place where we feel like including congenital deformities in very much the same class as the acute appendix. The early recognition and institution of treatment cannot possibly be overestimated in practically all congenital deformities.

WRY NECK (Torticollis): This deformity occurs as a result of injury during delivery. It is not always necessary that the injury be caused by instruments or by manipulation with the hands during delivery. It may occur as a result of the twisting and pressure during rotation through the parturient canal.

The actual damage causing wry neck is the tearing of the fibers of the sternomastoid muscle with a resulting hemorrhage into the tissues and the formation of a hematoma within the muscle sheath.

If this hematoma is treated by massage, heat and rhythmical stretching of the muscle during the early stages, it usually disappears and the muscle returns to its normal elasticity. If it is not treated at an early stage, organization of the hematoma occurs with the development of fibrous tissue bands. These become so strong that they cause a shortening of the muscle which may never be overcome except by operation.

There are a few exceptional cases of true congenital wry neck which are the result of deformities in the cervical vertebrae. This group should also have early attention but is not so amenable to treatment.

BIRTH PALSY: This condition is also an accident of delivery. It is due to a stretching or tearing of the brachiel plexus which causes a paralysis of the muscles supplied by the injured nerves.

The injury may occur as a result of traction applied to the arm in certain difficult labors or by the application of instruments. It also occurs, however, where no mechanical aid has been given in delivery and we must assume here that it is due to tortion and pressure on the shoulders in the passage through the birth canal.

There are two types of birth palsy: (1) The upper arm type (Erb's paralysis), in which there has been a stretching of the upper trunks of the brachial plexus, but rarely any actual tearing of the nerve fibers. With this type, flexion of the fingers is almost always possible. There is paralysis of the deltoid muscle, teres minor and infraspinatus, and the arm is rotated inwardly by the subscapularis, latissimus dorsi and the pectoralis major. The biceps is usually paralyzed, as are also the supinators of the forearm and the extensors of the wrist and fingers.

Since it is not a permanent type of paralysis the first step in treatment is to thoroughly protect the affected weak muscles against the stronger ones. This is done by placing the arm in a splint or in plaster-of-Paris in the abducted, externally rotated position. This alone might be sufficient to lead to recovery but the stimulation of the weaker muscles by heat, massage and rhythmical exercises undoubtedly is an important factor.

The recovery, in cases treated in the first week or two, of life, is more rapid than those which do not receive treatment until later. But the rapidity of return in action of the paralyzed muscle may depend upon the extent of injury to the nerves themselves.

When active use of the deltoid and other muscles has been confirmed by careful examination, the splint may be left off for an hour or two during the day so that the child may learn to use the arm normally. The complete discontinuance of the splint should not be allowed until there is active power of complete external rotation and abduction, as well as flexion of the elbow and extension of the wrist. If the splint is discontinued too early, the recovery will lack completeness. Daily stretching in abduction and external rotation should be continued for a number of months after the brace has been discarded.

(2) The whole arm type (Aaron-Duchenne or Klumpke type) has a bad prognosis. The treatment is the same as in the upper arm type, i.e., early application of splint or cast in abduction and external rotation. Here the paralysis is more severe and there is a tendency to claw-hand formation. If there is no evidence of recovery within a few weeks, surgical investigation of the plexus should be made with suture of the nerves of the plexus, if they are found to be torn apart.

After-treatment is similar to that in the Erb's type but recovery, if it takes place, is very slow.

CONGENITAL DISLOCATION OF THE HIP: The cause of this deformity is not known. There are many theories. Jansen believes it is due to a congenital flattening of the acetabulum. Some believe that stretching of the capsule of the hip joint, as a result of the position of the foetus in the uterus, takes place and leads to dislocation when strain is put upon the hips by weight bearing. That dislocation follows from one generation to another is an established fact. The deformity is usually not discovered until the child begins to walk. As to sex, the condition predominates in a proportion of four to one in females.

With this deformity the importance of early treatment is again emphasized. A case has recently come under observation in which, by accident, the dislocation was discovered at the age of one week. In spite of negative x-ray findings a convincing demonstration of the disloca-

tion was made under anaesthetic. The dislocation was reduced and a plaster cast applied in abduction and external rotation. After ten days it was necessary to remove the plaster but the hip has remained in place and the child, now three years old, walks normally. The head of the femur retains its normal relation to the acetabulum.

When closed reduction can be accomplished without trauma which is usually possible up to the fourth or fifth year of life, it is the most satisfactory method of treatment.

If reduction cannot be obtained without force it is far safer to resort to open reduction as recommended by Galloway and Kidner. This not only avoids the possibility of poor function but greatly shortens the convalescent period.

The after treatment consists in active and mild passive motion to restore joint function, and in massage and salt baths to restore muscle activity. The difficulty experienced in obtaining adduction and internal rotation of the thigh is sometimes discouraging, yet no great force should be used until the case passes well beyond the normal period of recovery.

CONGENITAL CLUB FOOT (Equino-cavo-varus): When there are many theories as to the cause of any disease or deformity, it is certain that none of them are very convincing. Yet, in this deformity which has been recognized since the earliest medical records, we are not yet fully agreed as to its cause. It is distinctly hereditary.

The association of congenital anomalies of the lower lumbar spine with club foot have long been recognized. Let us assume that in the sequence of development of the spinal cord, there is a lagging in the closure of the bony neural arch in the lower spine as is present in spina bifida. If this happens, it is not at all unlikely that the muscles will receive their nerve supply abnormally. Let us suppose that the gastrocnemius, the tibialis posticus and the flexors of the toes are activated before the peroneal and extensor group. If this should happen the foot would be drawn inward, and, by the time the peroneal and extensor group received their normal innervation, a contracture would already have occurred and a "club foot" would be the result.

When the deformity, or contracture of the muscles, is overcome by correction with a plaster cast, extending above the knee, the weaker muscles are given a fair chance at competition and respond by taking up their normal function.

The majority of congenital club feet will recover quickly if treated immediately after birth. It may seem difficult to obtain much correction in the first application of a cast, however, when it is changed in a week or ten days we are astounded to find how easily further correction may be obtained.

The delay of one week in the treatment of a congenital club foot may mean the addition of one month's time to its correction. The delay of one month in the treatment may mean the delay of one year in its correction. With proper application of the plaster a baby one day old may well tolerate a moderate correction. Growth is so comparatively rapid at this time, however, that one week is as long as a cast should remain.

If begun at birth, the application of three or four corrective casts is usually sufficient. Following this the foot should be stretched to the over-corrected position two or three times daily. The stretching of the tendo-Achilles should not be neglected. The baby may usually be made to contract the peroneal muscles by tickling along the outer side of the foot. The extensors can usually be stimulated by tickling the sole of the foot. Massage of the leg with particular emphasis upon stimulation of the extensors of the toes and peroneals is valuable in the after-treatment.

In children who do not recover promptly, an operative procedure consisting in decancellization, (curetting out the inner bone contents), of the neck of the astragalus, cuboid and anterior portion of the oscalcis has been a valuable method of obtaining permanent correction. This is particularly applicable where the age of the child does not justify any operative procedure which might disturb the joints and affect growth.

It is sometimes necessary to lengthen the tendo-Achilles before complete correction of the club foot can be obtained. In persistent cases the lengthening will give no correction until the posterior portion of the capsule of the ankle joint has been incised and the contracture freed.

CONGENITAL FLAT FOOT (Calcaneo-varo-valgus): The cause of this deformity is apparently the same as that of congenital club foot. Suppose, therefore, we assume that the sequence of innervation of the muscles has been upset by the closure of the bony neural arch in such a way as to cause delay in nerve fibers reaching the gastrocnemius and tibialis posticus. The resulting contracture would then be in the toe extensors and the peroneals. In this deformity the toes touch the front of the leg on the outer side, and the heel points downward. It is a deformity which might easily be unrecognized or condoned with the statement that it will be outgrown, and the child "recovers" with a flat foot.

The application of one or two corrective casts is sufficient. These need be applied only as far as the knee with the foot in the position of plantar flexion and inversion.

After-treatment is directed toward stretching the tibialis anticus and the peroneals.

The treatment of congenital deformities in the early stages is a short and satisfactory task. Any of them, if allowed to exist even for a few weeks, may become a serious and prolonged undertaking and may never be completely corrected without surgery.

The Treatment of Some Neurological Conditions by Physiotherapy

By F. G. Lindemulder, M.D., Ann Arbor, Mich.

The therapeutic value of natural forces such as sunlight, heat, water, and exercise, has been recognized and used in the treatment of diseases for many centuries. By proper application of these, convalescence from illnesses may be shortened and patients made more comfortable. Physiotherapy has a decided place in the treatment of various neurological diseases. In some instances, it not only relieves pain but also helps to restore motion in involved parts; thus hastening an otherwise slow recovery. Some of these conditions will be discussed in this paper.

In the treatment of neuritis it is necessary, first, to determine the etiology. Whenever possible, the cause should be removed, and in cases due to diphtheria, syphilis, alcohol, lead, arsenic, pressure, trauma, and foci of infection this may be possible. However, in diabetic neuritis this cannot always be done. When a nerve fiber undergoes pathologic changes irrespective of the cause, the myelin sheath breaks up, the axis cylinder becomes fragmented, and the cells of the sheath of Schwann proliferate and connective tissue may take the place of the nerve fiber. Peripheral nerves contain both motor and sensory fibers, and so both are involved. There may also be vasomotor disturbance, since sympathetic fibers run in the peripheral nerves. The degeneration, if peripheral in the beginning, may involve the nerves proximal to the point of injury and then the nerve roots and cells of the spinal cord. The fact that the nerve roots and spinal cord may be affected can be shown by increase in globulin content and in the number of cells in the spinal fluid, and by the colloidal gold and mastic reactions.

Patients suffering from neuritis may complain of paresthesias, pain, weakness, paralysis, and sensory disturbances. The fact that the nervous system is involved is demonstrated by the loss in reflexes, and thus there is a break in the reflex arc.

In treating this type of disease from a physiotherapy standpoint, it is necessary to have the involved part at physiological rest for long intervals each day; thus limiting motion and avoiding contractures. This may be done by the use of plaster dressings, frames, braces, etc. Whirlpool baths of the affected part may be given once or twice daily. The bath temperature should be about 110° F. and the treatment should last for twenty minutes. The warm water may cause an erythema of the part treated, however, this phenomenon may not occur during the early treatment; thus suggesting involvement of the sympathetic nerves. The heat may cause dilatation of the blood vessels and also aid in reducing the pain. During the bath the body temperature is elevated and the patient perspires freely. Directly following the bath care should be taken to avoid exposure to cold. The whirlpool and the buoyancy of the water may make active movement possible, and patients should be encouraged to move the part treated, under water. If motion cannot be obtained actively, passive motion may be used. The whirling movement of the water causes a mild massage. This type of treatment may be carried out until all tenderness has disappeared. Then manual massage and electrical treatments, using either galvanic or faradic current, may be used. These, however, should not be given until all tenderness has left the involved part. By this method restoration of motion may be hastened, muscle atrophy lessened, convalescence shortened, and pain relieved.

In the treatment of various diseases including neurosyphilis, Parkinson's disease, and multiple sclerosis, high temperature baths have been advocated. The baths may be given daily or every other day. The patients are immersed up to the neck in a continuous bath at 104° F. for ten minutes; thus getting the body accustomed to warm water. The bath temperature is then elevated to 110° F. and usually kept at this reading for thirty minutes. It is then lowered to 104° F. and maintained at this point for twenty minutes, making a total of one hour in the bath. The mouth temperature should be taken every five minutes, and often reaches above 106° F. during this period. The patient is then removed from the water and wrapped in blankets, special care being taken to avoid exposure from drafts. The condition of the patients during the baths varies with the individual; generally, co-operation is good, with no complaints during the first fifteen minutes. Then there may be a period of restlessness and slight confusion, especially when the mouth temperature is at its highest. Following the maximum fever, there is a period of mental depression. If patients have high caloric diets while taking the baths and are weighed daily, there usually is a gain in weight despite the weakening effect of the treatment. This type of therapy is beneficial to some patients.

Hiccoughs are often relieved by immersing the patient in a continuous bath with the water at 104° F. for twenty minutes. Obviously, it is impossible to use this type of treatment in the presence of some surgical wounds. If it is possible for a patient to be placed in such a bath, the condition is often relieved entirely or for several hours. It is difficult to explain why this method of therapy aids the condition, but it may possibly be due to the elevation of the body temperature or dilatation of the blood vessels.

Thrombo-angiitis of obliterans, or Buerger's disease, is said to be an infectious condition of the blood vessels of the leg. The dorsalis pedis artery cannot be felt pulsating in the involved extremity. There is reddening of the pendent limb and blanching on elevation above the horizontal plane, with change in skin temperature. The patient has paroxysmal pain, especially on walking. Contrast baths have been recommended for this condition and often there is virtue in the treatment. The bath consists of placing the involved extremity first in warm water (105° F.) for fifteen seconds, directly followed by submerging the limb in ice water for fifteen seconds. This contrast may be done from five to eight times and repeated every twelve hours. Some patients are greatly

relieved for long periods of time by the application of this method and this also may aid in preventing ulcers. The explanation may be that the contrast bath increases the volume flow of blood to the part treated.

Tabes dorsalis is a chronic syphilitic condition of the nervous system. In addition to degeneration of neurons, there is a pathologic process of the posterior columns of the spinal cord; namely, Goll and Burdach; other parts of the spinal cord are rarely involved. This condition may present in addition to evidence of neurosyphilis, a complaint of difficulty in walking and ataxia. Oftentimes, the patient is unable to walk without help. Frenkel exercises are of decided aid in teaching the patient to supplement the localized degenerative part of the spinal cord by other parts of the nervous system which are not involved. The re-education is a slow process and consists of daily exercises for coordination as have been described by Dr. H. S. Frenkel in his book, "The Treatment of Tabetic Ataxia by Means of Systematic Exercise." This type of exercise has been used in other conditions, such as multiple sclerosis. As this condition is characterized by spontaneous remissions and exacerbations, it is a question whether the improvement is due to the exercise or other influences.

Cerebral hemorrhage is probably the most common disease of the brain, and may take place at any age. However, the majority of such cases occur after the fourth decade. The clinical symptoms vary with the location of the hemorrhage. Hemiplegia probably is the most common sequelae of the condition. At first the paralysis is of a flaccid nature but later usually becomes spastic. Directly following the cerebral accident and for the first week it is probably better not to treat the patient from a physiotherapy standpoint other than passive movement, and this only occasionally. However, after the first week, and when the patient is definitely on the road to recovery, massage, passive movement, and re-education of the paralyzed part may be started.

In massage we have an agency that stimulates muscle tone and mechanically increases the circulation, arterial, venous and lymphatic. When a patient is confined to bed, and if there are no contraindications, daily massage particularly to the extremities, often hastens convalescence. It has been noted that patients do not feel as weak after they get up if this mode of treatment is carried out, and there is less wasting of the muscle tissue.

By the proper use of heat, water, exercise, massage and light, many patients suffering from various diseases of the nervous system show improvement. Only a few of these conditions have been mentioned in this paper. The favorable results obtained by physiotherapy usually manifest themselves only after a number of treatments have been given, and patience in the application of this art is necessary.

By this method of therapy convalescence may be shortened, restoration of motion hastened, pain relieved, contractures prevented, circulation stimulated, muscle atrophy lessened, besides being an important factor in keeping up the morale of the patient.

A New Method of Producing Fever—The Treatment of General Paresis

By Clarence A. Neymann, A.B., M.D., Associate Professor of Psychiatry, Northwestern University Medical School, and Stafford L. Osborne, B.P.E., Instructor Physical Therapy, Northwestern University Medical School

From the Department of Neuro-Psychiatry and Physical Therapy

Von Wagner Jauregg introduced artificial fever therapy into modern medicine as a result of his study and labor while living in the Orient and Near East. In these countries he noted the apparent contradiction of wide spread syphilis with rare late luetic insanity. He surmised that this apparent anomoly was the result of either a greater natural immunity, a less virulent strain of the organism treponenum pallidium, or some unknown factor. He finally came to the conclusion that the unknown factor was the missing link. Malaria fever is an almost universal infection among these people. After much labor and experimentation Jauregg concluded that this was the missing link and in 1918 his classic work on malarial inoculation as a therapeutic agent was first published.

This work was followed by that of Plaut (1) who inoculated patients with indulent fever. Then came the announcement of Solomon, Berk, Theiler and Clay (2) in 1926 reporting the use of Sodoku or rat bite fever. Finally came the report of Kunde, Hall and Gerty (3) a year later stating that they were able to secure excellent results by the injection of typhoid vaccine, or inactivated dead typhoid cultures. All of the therapeutic procedures have proven successful in the treatment of this almost hopeless disease. The actual cause of the remissions is still a debatable question. Many theories have been advanced. Some maintain that immunity is secured by a cross protein immunity from other kindred or allied organisms. In his Harvey Lectures, 1908, MacCallum (4) discussing the role of fever, stated that fever is probably a beneficial reaction that should not be interfered with and that production of immune bodies probably proceeds at higher temperatures in a way which is impossible at lower. He expressed the conviction that the febrile process is advantageous to the organism, and doubtless associated with the development of protective substances to combat the injurious agencies that have invaded the body. No matter what form of therapy used, however, fever is the one common factor. To us, fever seemed to be the causative factor in remissions and regardless of its method of production. The production of an artificial fever by means of high frequency currents instead of by the introduction of foreign protein or infection seemed to us to be an ideal method, if possible, of attainment. Moreover we felt it ought to help decide whether the mechanism at work is that of hyperpyrexia alone. This method also offered the possibility of fever control at will, something never hitherto accomplished. Much pioneer work was done and has been reported by us (5) elsewhere.

Four years ago we started our work with diathermy. Our early work was done with animals, then normal adults and finally with general paretics. A great deal of clinical experience was necessary before the method of application proved to be safe and reasonably feasible. The greatest difficulty was in discovering and applying suitable electrodes, as well as the proper distribution of the current. These difficulties were finally overcome. There is still room for improvement and undoubtedly as the method gets into more general use improvements will be made. Our technique, however, is safe and easy to acquire if strictly followed as outlined.

The prime requisites for the production of artificial fever by diathermy are a well constructed high frequency machine capable of delivering four thousand milliamperes under load, properly constructed electrodes and thorough heat insulation of the patient.

The ordinary high frequency machine made by a well known manufacturer of electro-therapeutic apparatus was used in our early experimental work. They also built for our use an apparatus of greater capacity. This new high frequency machine is capable of delivering

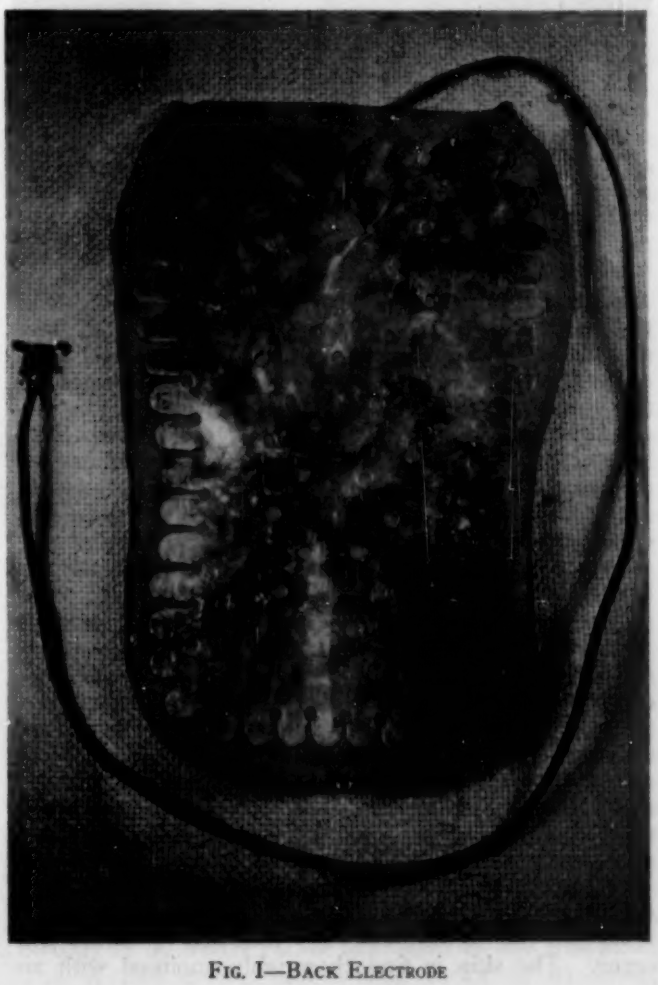


FIG. I—BACK ELECTRODE

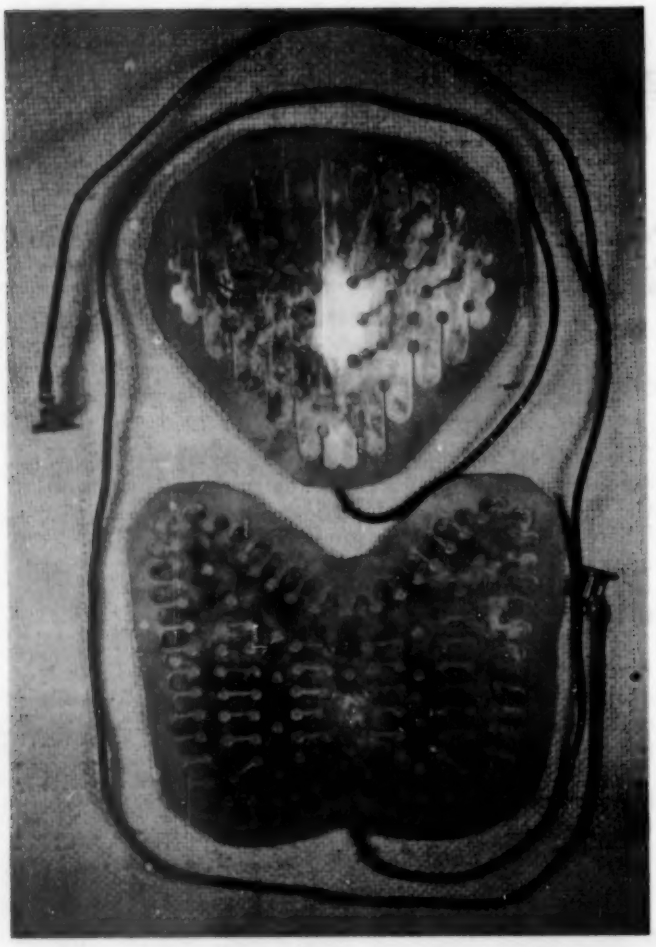


FIG. II—CHEST AND ABDOMINAL ELECTRODE

under load not less than seven thousand five hundred milliamperes, thirty-five to one hundred volts, and has a frequency of five hundred to fifteen hundred kilocycles. This machine is capable of giving more than double the power of the usual high frequency machine, and more than can be safely applied to a patient under treatment.

After a great deal of experimentation electrodes of the size and shape illustrated in Fig. I and Fig. II were selected as the best adapted for this work. Fig. I illustrates the back electrode and Fig. II the electrodes for the chest and abdomen. The patient's cords leading from the machine to the electrodes were soldered to the back of the electrode in such a way as to permit an even current distribution and also to prevent the cords breaking contact accidently or by the excited patient deliberately tearing them off. It will be noted that the electrodes are fenestrated and this was done in order to lengthen the edge in proportion to electrode area. Such an electrode decreases so called "Edge effect" making for greater comfort as well as decreasing the possibility of burns. A rheostat Fig. III is placed in the patient's circuit for the purpose of dividing the total current so that two-thirds of the current is passed through the chest and one-third through the abdomen. Thus allowance is made for the difference in resistance of the chest and abdominal structures. By means of this arrangement it is possible to pass sixty-five hundred milliamperes through the body for many hours with safety. The amount of current used will vary somewhat with different types of patients, but if kept below this maximum and our technic carefully followed no burns will occur. The skin is first thoroughly anointed with an electrolytic jelly and then the metal electrodes are applied. These are held in place by a properly fitting canvas jacket and so arranged that displacement of the electrodes is not likely to occur with vigorous movements of the patient while in bed.

The patient's bed is prepared by first spreading a rubber sheet over the mattress and then three blankets are placed over this and tucked in. The patient lying on this is covered with a blanket and another rubber sheet and all clothing removed. More blankets are applied until approximately nine in all are covering the patient who is tucked in snugly around the shoulders and feet to prevent all possible loss of heat. Thorough heat insulation of the patient is thus secured.

The current is gradually turned on to about three thousand milliamperes. In about fifteen to thirty minutes the patient will begin to perspire profusely. The skin resistance will then be lower and in consequence the current strength can be gradually increased until the maximum is reached. Any complaint of discomfort or tingling from the current should not be ignored but carefully investigated by seeing that the electrodes are in their proper position.

The electrodes are made of a pliable metal backed by a half inch thickness of sponge rubber. After continual use the outer tongues of the electrodes may become torn, bent, or roughened. This may give an uneven apposition to the body so that some of the tongues may press into the flesh and thus cause current concentration at these points leading to marked discomfort and probable burns. Therefore it is a wise precaution to examine the electrodes each time before using. Again it is an excellent procedure to flatten and roll out the

FIG. III—RHEOSTAT IN USE CONTROLLING CURRENT TO CHEST AND ABDOMEN

electrodes so that they will be quite smooth and thus make better apposition.

Water or other fluids are given quite freely to the patient during treatment. Every fifteen minutes the rectal temperature is taken until a fever of 103.5° F. is reached, after which it is taken every five minutes. When a temperature of 104.5° F. is reached, the current is turned off. Usually the temperature will then rise about one degree Fahrenheit. The momentum of the initial rise, and the subsequent rise after the current is turned off depend on the mass of the patient; the thoroughness of the heat insulation, and certain other as yet unknown physiological factors. It varies with the individual. Clinical experience is the only guide at present. A temperature of 104.5° F. can usually be reached in from one and a half to two hours. Some patients are able to maintain their temperatures almost indefinitely if kept properly covered and require only a single application of the current to maintain a fever between 103.5° F. and 105.5° F. for five, or six, or even eight hours. On the other hand some patients require two, three, or even more applications of current to keep this optimum range of temperature. Again, there are patients who show the tendency to acquire temperatures easily and to overshoot the optimum therapeutic range. Such a case has been quoted in a previous article (6). This type of patient after reaching 104.5° F. and with the current turned off they will rapidly rise one degree and then instead of staying or falling off at this level will still gradually continue to climb until temperatures of 106.°F. or over 106.5° F. are reached within the next two hours. It is best, therefore, to remove the canvas jacket when the temperature reaches 106° F. Thus it is essential that a continual temperature check be taken even though the current has been shut off until normal temperature is reached to obviate any undesirable accident. The rectal temperature alone is relied upon because it is difficult to secure absolute co-operation at all times from the patient and mouth ventilation makes it extremely unreliable to take mouth temperatures as a guide. And so early in our work we discarded mouth readings. It was quite interesting however to find in our early work that while at the beginning of the treatment there might be quite a difference between rectal and mouth temperatures, that, as the treatment progressed the two divergent temperatures gradually came closer and closer together until finally they were practically the same. Thus we came to recognize rectal temperature as a far safer method of checking the degree of hyperpyrexia. At a fever of 102.5° F. all patients become quite restless, excited, and semi-delirious. This however is also true of normal individuals. For restless, demented and psychotic patients it is advisable to administer morphine, gr. ¼, hyoscine gr. 1/100 before treatment is begun, or perhaps better still, to apply surgical restraint to the extremities. If the patient should become so restless and throw himself violently about in the bed, or sit up abruptly, or even in his delirium actually get out of bed, the electrodes may become so displaced that a severe electrical burn is liable to occur due to poor electrode contact or from the electrode prongs digging into the flesh causing current concentration at that point. Under these circumstances, then, it is well to turn off the current and readjust the electrodes. Although we have dealt with the most violent paretics imaginable we have never had a severe burn since our technic was perfected.

Hyperpyrexia produced by high frequency currents permitted us to secure temperatures at any desired height or any desired temperature for any length of

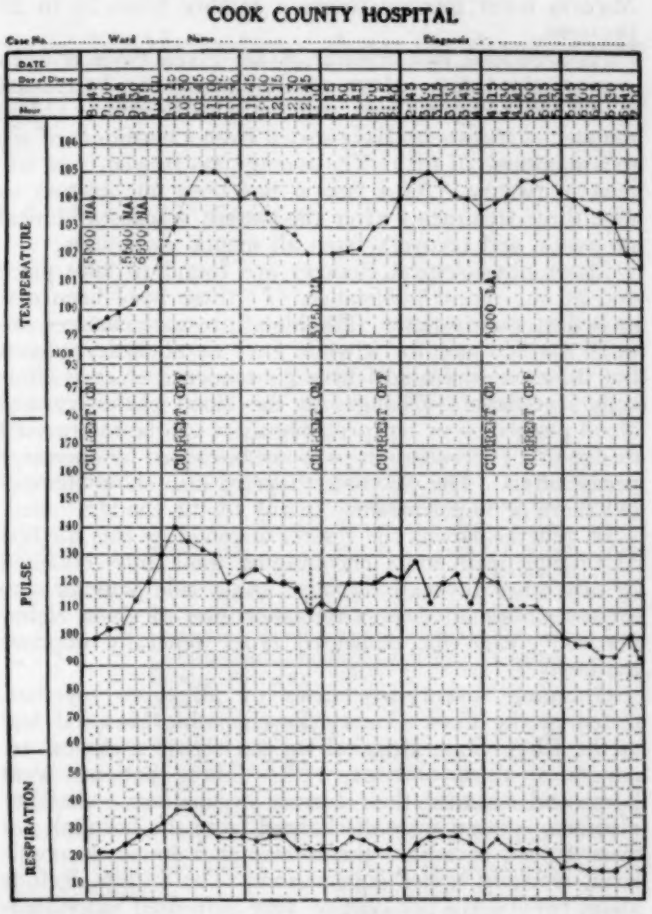


Fig. IV - Typical Temperature Curve.

time deemed desirable. Moreover, it is absolutely under control at all times. These features were thus possible of attainment for the first time while producing hyperpyrexia and are more than sufficient to warrant its use over the older methods. In illustration Fig. IV we submit one of our typical curves as an example. A current intensity of fifty-two hundred milliamperes was reached in fifteen minutes and later increased to sixty-six hundred milliamperes. In one and three-quarter hours the patient had reached a temperature of 104.2° F. when the current was turned off. During the next fifteen minutes a further rise occurred. In the ensuing two and one-half hours the temperature was allowed to drop to 102° F. Thirty-seven hundred and fifty milliamperes were then reapplied for one hour and fifteen minutes, a direct rise to 103.1° F. resulting, followed by a later rise to 105° F. Finally there was a second drop with a third application of current and a corresponding temperature rise. Many such temperature curves have been produced and although this is not by any means the best curve it will serve to illustrate the manifold possibilities. The optimum length of temperature maintenance varies with the condition of the patient. In general, five hours of temperature above 103.5° F. are recommended, although we have kept the temperature of many patients above this point for seven, eight and even nine hours. Early in our work only patients were selected that were free from organic disease other than general paresis, but latterly we have treated obese, marasmic and debiliated patients and even individuals with diabetes and organic heart disease. So far over one hundred patients have been treated and no deaths directly or indirectly can be attributed to this treatment. This is also another outstanding factor in its favor.

Malaria fever therapy shows a fatality from 10 to 33 per cent.

As a general rule treatments are given twice a week —every third day. More robust patients can be treated every other day without any undesirable effects. The number of treatments have varied from a minimum of six to a maximum of fifty. The average has ranged from fifteen to twenty. As a rule it has been our custom to give three treatments after the patient reaches a clinical remission and recovers from all mental symptoms.

Many physiological changes are found to take place and in our recent publication (7) these have been discussed at some length. The blood pressure changes are quite marked and for a while gave us no little concern but these we find are of little consequence or even clinically significant. Changes in the blood chemistry and blood picture occur but probably these can be interpreted as due to a concentration phenomena caused by excessive perspiration. The electrocardiogram also show changes but there is no permanency in any of the changes noted.

In general paresis the results obtained by this method of therapy seem more encouraging than those obtained by any other form of therapy. As a rule patients who are not demented show a remission rate of about eighty per cent; even the demented types generally improve markedly.

Grouping seventy-five cases of all types together, tested at the Cook County Psychopathic Hospital and at the Elgin State Hospital we can report a clinical recovery of thirty-nine per cent. These patients went home and resumed their former occupations. Another nineteen per cent were discharged from the hospital, but were forced to adjust themselves at a lower econonic level, working under supervision. The results include about twenty-five per cent of very demented individuals who were considered hopeless from the start, having been incapacitated, hospitalized, or treated with other forms of therapy for years.

The final or end result of this therapy remains a problem of the future. Some patients have been in a state of clinical remission for two years since their discharge from the hospital. An average period of eight months has elapsed since treatment was completed for those at work or at home. The serology of the blood or spinal fluid as a rule shows a slight tendency toward readjustment to normal findings. The colloidal gold curve has a definite tendency to become less marked. Now and again the Wasserman reaction decreases in intensity and the spinal fluids of a few sporadic cases have given normal tests months after treatment ceased. We therefore recommend that the treatment be followed by an intensive aftercare with tryparsamide, bismuth, and potassium iodide. These serologic reactions do not coincide with the outspoken clinical results we have observed, nor does a reduction of the serologic tests necessarily presage clinical recovery.

Thus far we have spoken only of treatment for the hospitalized patient. If the mental condition of the patient is such that institutional restraint is not necessary the continued residence within an institution is not an absolute requisite. Many patients have been treated ambulantly. They remain in the sanitarium for twenty-four hours, then leave and return for the next treatment.

Weakness for a number of hours is the only objectional feature of this treatment. Hyperpyrexia produced by diathermy differs from infective febrile therapies in that it can be given ambulantly.

The death rate with malarial therapy varies from ten to thirty-three per cent. One hundred and ten cases treated or now being treated with diathermy, are all alive with six exceptions. These deaths occurred months after treatment had been discontinued and could be attributed to the natural progress of the disease.

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Paralysis of the Shoulder Muscles Following Acute Anterior Poliomyelitis—Anatomy, Examination and Treatment

By Daniel H. Levinthal, M.D., F.A.C.S , Chicago*

INTRODUCTION. Since 1916 the Visiting Nurse Association of Chicago has done special physical therapy in the homes, first with children who had had infantile paralysis, and later to help restore function to muscles and joints affected by disease or accident, such as arthritis, burns, fractures, etc.

Each year, several Chicago orthopedic surgeons hold clinics and lectures for the Visiting Nurses and other workers interested in crippled children, particularly workers in the public schools, and physical therapists of the larger hospitals. Other members of the Physiotherapy Association are invited to these clinics and demonstrations.

The splendid cooperation of the Visiting Nurses and the school workers is appreciated by the orthopedists, so that clinics and lectures such as the following are readily presented.

The subject of shoulder paralysis with charts and case presentation was given at Michael Reese Hospital, October 16, 1930, as one of the Edith Butler Pool Lectures, which the Visiting Nurse Association is privileged to have annually in memory of a former member of its Board of Directors.

ANATOMY

The shoulder joint is an enarthrodial diarthrosis (ball and socket joint), with the greatest range of motion and least security of all of the joints.

The joint consists of the hemispherical head of the humerus and the shallow pear-shaped glenoid cavity. Above, the joint is reinforced by the acromion process and medio-anteriorly by the coracoid process. The head of the humerus is proportionately much larger than the glenoid fossa.

The glenoid cavity is encircled by and is deepened by the glenoid ligament. The capsular ligament is a loose fibrous cylinder attaching proimally to the glenoid margin external to the glenoid ligament, and to some extent to it, and distally to the neck of the humerus. An opening above the intertubercular groove permits the long head of the biceps to emerge. Superiorly and anteriorly is another opening in the capsule for the tendon of the subscapularis muscle. Sometimes there is a third and smaller opening under cover of the tendon of the infraspinatous muscle.

The joint is reinforced by the tendons of the subscapularis, and supra- and infraspinatous muscles which fuse with the capsule. The joint is further reinforced by the coraco-humeral, coraco-acromial and acromioclavicular ligaments.

The joint is lined with a synovial membrane which communicates with the subscapular bursa which lies between the capsule and the tendon of the subscapularis muscle.

Movements of the shoulder joint are flexion (forwards), extension (backwards) abduction, adduction, rotation and a combination of these called circumduction. The movements of the shoulder joint are augmented by scapular mobility.

The following chart shows the movements of the shoulder joint, and the muscles which act to produce these movements. (Cunningham.)

ABDUCTION 90°	ADDUCTION 45°	FLEXION—forwards 180°	EXTENSION—backwards 180°
Deltoid	Teres major	Deltoid (anterior fibers)	Deltoid (posterior fibers)
Supraspinatous	Teres minor	Subscapularis	Teres major
	Pectoralis major	Pectoralis major	Infraspinatous
	Latissimus dorsi	Coraco-brachialis	Latissimus dorsi
	Coraco-brachialis	Biceps brachii	Triceps
	Biceps (short head)		
	Triceps (long head)		
	Weight of the limb		

ROTATION LATERALLY—180°	ROTATION MEDIALLY—45°
Deltoid (posterior fibers)	Deltoid (anterior fibers)
Infraspinatous	Teres major
Teres minor	Pectoralis major
	Latissimus dorsi

CIRCUMDUCTION
Combination of previous muscles

In addition to the above, the accessory muscles concerned with movements of the shoulder girdle are—the trapezius, omohyoid, levator scapulae, rhomboideus major and minor, serratus anterior, and pectoralis minor.

EXAMINATION

When acute anterior poliomyelitis affects the muscles of the shoulder, the primary muscle examination is made and charted at the earliest opportunity before treatment is started.

The patient lying supine is unable to abduct the arm partially or completely. Numerous problems may present themselves since the muscles involved and the extent of involvement varies so in these cases.

Knowing the numerous muscles mentioned above, with their relative origins, insertions and actions, the matter of relaxation of the muscles most severely involved is relatively simple.

The extent or degree of paralysis may vary from simple muscle weakness to total paralysis. The original examination may be made with the limb in a position favorable for the contraction of the muscles involved and against gravity. If there is no response, then movements under more favorable positions or conditions are encouraged either by assistance of the examiner, relief from gravity by the use of a very smooth, powdered board for horizontal movement or by attempted movements with the limb immersed in water or warm salt solution. These muscles should also be tested against resistance. The spring balance test is accurate. The affected muscles must always be compared with their mates.

*Read before the Orthopedic Division, Visiting Nurse Ass'n., of Chicago at Michael Reese Hospital, October 16, 1930.

A chart is used to record the estimated muscle power, either grading this power according to numbers or using terms gone, trace, poor, fair, good or normal. As the treatment progresses, muscle examinations are made and charted.

TREATMENT

The methods of treatment of acute anterior poliomyelitis vary with the stages of the disease. The disease is divided into the following stages, the acute, or stage of onset, the convalescent, or stage of recovery, and the chronic or stationary stage. The acute stage is divided into the preparalytic and the early paralytic. The treatment is divided into the prophylactic, symptomatic, non-operative orthopedic, and the operative treatment. The prophylactic treatment consists in isolation, disinfection of the excreta, the administration of urotropin which is entirely empirical, and spraying the nose and throat with hydrogen proxide. The symptomatic treatment consists of the treatment according to the indications which present themselves, namely, cathartics, anti-pyretics, sedatives, and of course isolation and absolute rest in bed.

It is questionable whether convalescent serum should be given as a prophylactic measure, however, *convalescent serum should be given* in the preparalytic stage as soon as the diagnosis is established. It should be given both intraspinally and intravenously in large doses and should be repeated. It has been found that a serum from a patient who has acute poliomyelitis mixed with that of patients who have had it five, ten, and twenty years ago is the most effective. It is conceivable that serum given in the early paralytic stage may be of distinct value particularly in progressive cases.

The treatment of the early paralytic stage is continued until the stationary period or chronic stage is reached. It combines symptomatic treatment with the proper application of physical therapy and orthopedic management. Of prime importance, is the prevention of deformity. Absolute rest is essential.

As soon as the paralysis is evident, it is important that those muscles which are paralyzed be placed in a position of absolute rest and must be maintained so with extreme care never to stretch them.

The first essential, as a rule is relaxation for the abductors,—the deltoid and supraspinatous. This is accomplished by abduction and external rotation, with a rectangular brace or plaster of Paris gutter shelf, or by gently attaching a restraining band from the well-padded wrist to the head of the bed. But if the fibers of the deltoid involved are chiefly the anterior ones and the pectoralis major is paralyzed, then flexion (forward) and to the horizontal plane of the body is indicated.

The pain and tenderness of the limbs may be relieved by the application of dry or moist heat, or contrast sprays, or if the patient can be moved, by immersing the affected parts in a warm bath. This can best be done by carrying the patient in a sheet used as a hammock and immersing the patient with the sheet.

As soon as the pain and tenderness permits, gentle smoothing massage several times daily is done. The paralyzed muscles are constantly held in a state of relaxation. Sedatives are given for restlessness or excitability. Ice bags to the head and neck may relieve some of the pain of the cerebral type. At times morphine or paragoric is indicated. Lumbar puncture may relieve some of the intradural pressure and may be repeated until the pressure approaches normal.

Muscle training is started early. By muscle training, we attempt to bring into activity those muscles which are lying dormant. *Fatigue must always be avoided.* Exercises which cause increased function in the healthy muscles are detrimental since they increase the disbalance of muscle power. *The prevention of deformity is far easier than the correction.*

Too frequently developing deformities are overlooked in the zeal to treat the general condition.

The most effective means for preventing deformity is an immobilization apparatus. Plaster of Paris is a most effective retentive apparatus. A circular plaster of Paris cast holding the part in the best anatomical position is applied at the earliest opportunity. This is bivalved after several days to permit physical therapy.

The greatest return of muscle power occurs during the first two months after the stage of onset. When the shoulder group is involved, it is necessary to place the arm at about ninety degrees of abduction with about forty-five degrees of external rotation. This can be accomplished by placing a triangle above the abducted arm towards the head of the bed, resting the forearm and hand against the side of the triangle. The hand being dorsi-flexed, the elbow being at about a right angle. The arm should not be carried down to the side of the body. As soon as the patient is ready to become ambulant an abduction plaster cast should be applied. If the cast is used it can be shelved so that the arm can be raised out of the trough for physical therapy and muscle training.

When a case is seen with deformities already developed through lack or in spite of proper treatment, it is important that these deformities be corrected at once. It may be necessary to manipulate or do a conservative operation such as tenotomy or fasciotomy with perhaps a wrenching, followed by the proper mechanical support. Operative measures for the correction of major deformities and improvement of function are usually deferred until two years or more have elapsed since the onset of the disease. Most of the major operative procedures are deferred until the child is over eight years of age.

In paralysis of the muscles which move the shoulder joint the object is to improve function and not to correct deformity. If the patient be a child under eight years of age, retentive apparatus holding the parts in the position of salute may be discarded after two and one-half years of treatment when the child has attained the maximum improvement that it will obtain by conservative measures. It is then advisable to await more complete ossification of the bones forming the shoulder joint before attempting the operation of arthrodesis, if that is the operation of choice.

Other operative procedures aim at tendon or muscle transplantation, attempting to restore function in the paralyzed deltoid by attaching proximal muscles to the paralyzed abductors. Mayer's operation consists in detaching the trapezius from its insertion into the spine of the scapula, the acromion, and the clavicle, lengthening it with a strip of fascia lata which is inserted into the humerus near the insertion of the deltoid denton. A trough is made above the shoulder joint by removing a portion of the acromion process. It is necessary that the trapezius in such cases be strong. There must also be good power in the serratus magnus and upper part of the pectoralis major, and also the biceps or the coracobrachialis. This operation requires several months of post operative exercise. The cosmetic and functional result may be better than the operation of arthrodesis. The operation is more difficult technically and therefore less certain than the operation of arthrodesis.

Arthrodesis of the shoulder should not be performed unless there is good function in the muscles controlling the elbow, wrist and fingers, and unless there is good function of the muscles which move the scapula. The patient should be able to shrug the shoulder powerfully.

Several types of arthrodesis are described, any one of

which carefully performed with the above requirements in mind will give a good result.

The operation preferred by the writer consists in an incision along the spine of the scapula around the head of the hemerus and across anteriorly to about the region of the coracoid process. The skin is reflected exposing the deltoid muscle. A U-shaped incision of the paralyzed deltoid muscle is made exposing the capsule of the joint which is likewise incised. One must be careful not to injure the tendon of the long head of the biceps. The joint is now exposed. The capsule is freed so that by upward pressure and external rotation, the head of the humerus is brought out of the wound and is denuded of cartilage and the cancellous bone is shaped like the upper end of a picket fence. The glenoid cavity is than denuded of cartilage down to raw bone. With the periosteal elavator the acromion process is denuded on its inferior surface and margins so that the entire thickness can be estimated. The acromion is then split horizontally into an upper and lower one-half. The lower one-half is turned downward filling the gap between the acromion and the upper edge of the glenoid. The head of the humerus is now returned to position, its angulated upper end being in contact above with the raw remainder of the acromion process, and medially in contact with the reflected flap of the acromion and with the denuded glenoid. It may be advisable to run several sutures through the head of the humerus, and through the acromion, tying them beneath the skin flap so that there should be no dislocation as the plaster cast is applied. As the wound is sutured, the arm is maintained in the position of abduction and forward flexion that is, in the "position of salute." In this position a plaster of Paris spica cast is applied.

Roentgenograms are taken several days after operation to check up on the relative position of the head of the humerus. A plaster cast remains in position for a period of three months after which it is removed and physical therapy is instituted. In younger children it may be necessary to use a brace for three to five months longer.

The operation of Key consists in denuding the upper surface of the humerus, detaching the tip of the acromion, and then using osteoperiosteal grafts, about two inches long around the margins of the glenoid beneath the elevated periosteum of the scapula. The free ends of the osteoperiosteal grafts project outward from the denuded glenoid cavity like the petals of a flower. A large nail holds the end of the humerus into the glenoid cavity. The grafts bridge across from the humeral head to the glenoid. A plaster of Paris cast maintains the position.

The operation described by Gocht, Jones and Lovett, and recently by Bruce Gill consists essentially in denuding the acromion and inserting it into a cleft in the upper end of the humerus which is made by chiselling off the greater tubercosity and part of the shaft of the humerus.

When the arthrodesis is complete, abnormal mobility of the scapula is necessary. This requires tràining and development of the scapular muscles. There is of necessity a tendency to scoliosis which is due to muscle disbalance. The patient should be able to bring the hand to the face and head.

The Importance of a Rehabilitation Program in Medical Education

By John S. Coulter, M.D., and Charlotte M. Morrison, B.S.

Therapeutics is the ultimate aim of medical education. The importance of diagnosis is not underestimated but the physician's duty does not end in making a diagnosis. He must institute therapeutic measures to restore health, shorten temporary disability, alleviate suffering and prevent permanent disability. The neglect of therapeutics is one of the serious shortcomings of medical education.

The use of physical agents is one of the most important parts of this therapeutic program. To use these agents, to their fullest extent, it is necessary for one to have a broad view of physical therapy. For this reason a department of physical therapy might better be called the rehabilitation department. Patients are human beings and as such have definite psychologic reactions which may profoundly influence their physiologic processes. Treatment must be continuous from the time of the beginning of the illness or receipt of an injury to the time the patient is as near as possible to the same physical and economic condition as before his illness or injury. This means a broad use of our physical agents and includes physical therapy, occupational therapy and vocational training as shown in the following chart.

This program will prevent patients being "discharged cured" when they are just able to totter from the hospital, destitute, and unable to carry on their former occupation. Northwestern University Medical School has started this program for their dispensary patients. The desire is twofold: first, to help the patient get full and complete treatment; and second, to educate the physician, medical student, nurse and technician to strive in their therapeutic program for functional and economic restoration of the patient. The number of patients that can be reached by treatment at the clinic is limited, but by the introduction of this program into medical education it is believed that this will show the importance of complete rehabilitation in therapeutics.

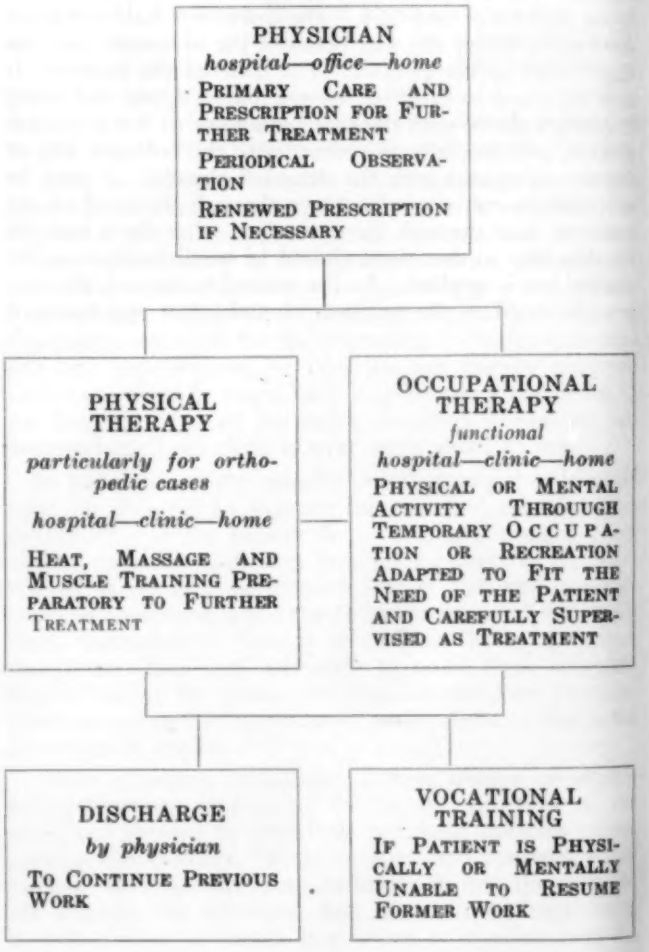
The physical therapy department is a reference department for treatment of cases from the other clinical departments. It has two therapeutic objects; first, to use physical agents of known value and to strive to use them better; and second, to discover and evaluate new physical agents and new uses for the old.

To achieve these objectives this department is carrying out a research program as follows:

RESEARCH

Use of External Heat: When an authority like Dr. Swaim tells us that of our chronic invalids 20 per cent are due to arthritis and only 9 per cent are due to the long dreaded tuberculosis we see the need for research in this field. We are attempting in our clinic to meet this problem in co-operation with the arthritis department by clinical research in the use of external heat in their cases. It is generally recognized that the proper prescribed use of heat, massage and exercise serve the several purposes of relieving much suffering, restoring deranged physiology and modifying organic disturbances of structure. Unfortunately limitations of time, space and personnel prevent adequate treatment of patients daily sent to the clinic. The success of the use of physical agents so often seen in the treatment of patients in sanatoria is due to their treatment lasting for hours. We are renting small bakers for home use with explicit directions for their use and the carrying on of massage and exercise. Thus we are replacing what would be at best three hours a week treatment to that many hours a day. The patient is impressed of the necessity of close supervision not only by the visiting nurse but of weekly checking of the doctor in charge.

PHYSICAL THERAPY—OCCUPATIONAL THERAPY
Correlation


PHYSICIAN
hospital—office—home
PRIMARY CARE AND PRESCRIPTION FOR FURTHER TREATMENT
PERIODICAL OBSERVATION
RENEWED PRESCRIPTION IF NECESSARY
PHYSICAL THERAPY
particularly for orthopedic cases
hospital—clinic—home
HEAT, MASSAGE AND MUSCLE TRAINING PREPARATORY TO FURTHER TREATMENT
OCCUPATIONAL THERAPY
functional
hospital—clinic—home
PHYSICAL OR MENTAL ACTIVITY THROUUGH TEMPORARY OCCUPATION OR RECREATION ADAPTED TO FIT THE NEED OF THE PATIENT AND CAREFULLY SUPERVISED AS TREATMENT
DISCHARGE
by physician
TO CONTINUE PREVIOUS WORK
VOCATIONAL TRAINING
IF PATIENT IS PHYSICALLY OR MENTALLY UNABLE TO RESUME FORMER WORK

Use of High Frequency Currents: The high frequency currents have a large place in every hospital. The teaching clinic again is often the place to determine and teach their value. Our department is carrying on work in this field in co-operation with the other clinical departments. A member of the neurological department has been investigating diathermy to raise body temperatures in the treatment of general paresis. Neymann and Osborne have published a report on this and read a paper at the last meeting of the American Medical Association.

The genito urinary department in our out-patient clinic is investigating the value of diathermy in the treatment of chronic prostatitis. They make the diagnosis, send the case to the physical therapy department for treatment and the case returns to them for judgement of the results. Once weekly the physics department co-operates and measures the prostatic urethral temperature with a thermocouple. This work may give negative results, but it is believed that it is valuable for the teaching hospital to do clinical research and publish negative results.

Our gynecological department is sending us cases to determine the value of diathermy in chronic salpingitis.

The nose and throat department is co-operating with us to determine the value of high frequency currents in tonsil conditions.

Another research problem underway is the production of therapeutic fever by radio-frequency currents. Interest in this field has become augmented in recent years by certain developments in the treatment of dementis paralytica. The method of producing fevers with the radio waves is still in the experimental stage, and our department of physiology is investigating this method with animals.

Constant and Interrupted Currents of Low Frequency: Duchenne in 1831 used electricity to stimulate muscles. There has been practically no scientific work since to prove its value. At Northwestern University Medical School we have a full time fellow working on the problem of the value of electrical muscle stimulation.

The nose and throat department is co-operating in the investigation of the use of the constant current in ionization of chronic suppurative otitis media and chronic rhinitis.

Ultraviolet Radiation: At Northwestern we have a fellowship established for the study of the use of ultraviolet radiation in skin diseases. It is advisable to exercise conservatism in the appraisal of lamps, as their reputation has unfortunately suffered by exaggerated reports of their value. The roentgen ray as used today in measured dosage has a much wider field of usefulness in dermatology than ultraviolet lamps, their place being nevertheless valuable although restricted. Two points in favor of ultraviolet lamps are their simplicity of operation and their freedom from danger. They are valuable largely as adjuncts to other forms of therapy.

The eye department is sending us cases for treatment with ultraviolet radiation. Dr. Gifford, the head of the department of Ophthalmology, has published a paper on this subject, and we are co-operating with him on further clinical research in this field.

Dr. Dillehunt, last February, in introducing Dr. Cutter, Dean of the Northwestern University Medical School, Chicago, to the Annual Congress on Medical Education, Medical Licensure and Hospitals, said: "The majority of the medical schools of the United States, it seems, were hesitant in establishing departments of physiotherapy as a part of the curriculum, a fact which is probably based on the difficulty of evaluating the prominence to be accorded the subject. At the present time in the main, medical schools are still wondering how much is to be invested in place and equipment and personnel adequate to teach medical students this important subject. One thing is certain, the whole field of physical therapy will never be on a sound basis until it is rendered sound by teaching of the subject in the medical schools. Fortunately, one medical school has given more than the ordinary attention to the subject and has developed what in my opinion is an extraordinarily good and sound practice with reference to the teaching of this subject."

Since that time Northwestern has added to its physical therapy department, with the help of the Chicago Woman's Club, a Curative Workshop to provide occupational therapy, and with the backing of the Good Will Industries of Chicago a vocational training department. These three parts of a whole department are working hand in hand to carry the individual over that dangerous period from being a patient to his taking his place again as a self-supporting useful citizen.

The value of the combination of the two fields—physical therapy and occupational therapy—has been recognized here and there by outstanding men in the medical profession. Dr. Mock recently said: "There is surely no doubt as to the therapeutic value of occupational therapy in the rehabilitation of the disabled soldier, and it is disappointing that the civilian hospitals have not profited more by the splendid results obtained in the army hospitals. The therapeutic value of occupational therapy as an aid in the rehabilitation of the disabled soldier was proved in thousands of cases. In these days when hospitals are crowded with just as serious cases, as well as the chronically disabling medical cases, occupational therapy and its sister, physical therapy, are equally essential for the rehabilitation of the disabled civilian. The medical profession should demand these adjuncts as a part of the hospital equipment."

Dr. Molander says that because the two sister sciences have so much in common they should not be kept apart by their differences, but combined so that each contributes its own particular attribute to a common end. It was the desperate necessity created at the time of the war that brought out these two sciences and found them to be most efficient. Statistics show that more people are injured in industry and daily life than the entire toll taken by the war. In the light of this fact the two elements of treatment that worked hand in hand proving themselves of such value, must not be overlooked today.

The best results are obtained through the combined use of physical therapy and occupational therapy. Physical therapy prepares the injured member for voluntary exercise through the use of heat, light, water, massage and muscle training. The ordinary physical therapy given to a patient at the most, only lasts an hour and the mechanical exercises here given have certain definite limitations. The human body is more than a machine and the formal repetition of movements either with or without an apparatus is not of maximum therapeutic value in increasing the amount of movement in a stiff joint or as an integral part of a large co-ordinated movement. There is no psychological stimulant for personal initiative, or for sustained effort. One without the other is not as successful as the combination. Physical therapy can improve circulation, free scars, stretch adhesions, re-educate muscles but it finds its limitation in the psychological element. The average patient can be told to exercise but unless occupational therapy is

used there is no incentive and interest provided to continue the exercise.

If after the patient has been discharged from physical and occupational therapy as cured or as having reached maximum improvement he is physically and mentally equipped to go back to his old job well and good. But all too many times before, the part was treated and the patient as an entity was lost sight of. If the doctor had done all he could at the operating table his responsibility was ended and no thought was taken regarding the fact the patient had been deprived of the legs or hands by means of which he kept body and soul together. By the third angle of this program Northwestern hopes to set that same patient on his feet in whatever means of livelihood lying within his capacity.

CONCLUSION

In its program for medical education, Northwestern is convinced that the cure of the patient is judged by the completeness of his functional restoration. Although the department can treat only a limited number of patients, it can, by presenting educational facilities, extend its influence in establishing a program of teaching and research.

Believing America's greatest asset is not her farms, institutions and manufactories, but her men and women, that the human wealth of America is worth many times that of her material possessions, Northwestern University Medical School is striving to emphasize the importance of a rehabilitation program in medical education.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912,

Of THE PHYSIOTHERAPY REVIEW, published bi-monthly, at Mount Morris, Ill., for Apr. 1, 1931.

State of New Jersey } ss.
County of Essex }

Before me, a notary public in and for the state and county aforesaid, personally appeared Dorothea M. Beck, who, having been duly sworn according to law, deposes and says that she is the editor of THE PHYSIOTHERAPY REVIEW, and that the following is, to the best of her knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of Aug. 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Kable Brothers Company, Mount Morris, Ill.; Editor, Dorothea M. Beck, Montclair, N. J.; Managing Editor, Dorothea M. Beck, Montclair, N. J.; Business Manager, Gertrude Beard, Chicago, Ill.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given. The American Physiotherapy Association; President, Edith Monro, Boston, Mass.; Treasurer, Mabel E. Holton, Ann Arbor, Mich.; Secretary, Constance K. Greene, Swampscott, Mass.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by her.

DOROTHEA M. BECK.

Sworn to and subscribed before me this first day of April, 1931.

(SEAL) Erland M. Nelson.

(My commission expires April 8, 1932.)

History of Physical Therapeutics

By Frank Hammond Krusen, M.D.

PART I—PHYSICAL THERAPEUTICS AMONG THE ANCIENTS

The use of physical agents in the treatment of disease dates back to the beginning of man. The first primitive man to crawl into the sunshine for its warmth and vitalizing effects unwittingly instigated heliotherapy; the first man who bathed a wound in some woodland stream unknowingly instituted hydrotherapy; and the first man who rubbed a bruised muscle unconsciously introduced massage.

Electrotherapy. About 600 B. C., Thales of Miletus, "chief of the Seven Sages of Greece,"[1] "rubbed a piece of fossil resin and observed the amber attracting bits of cloth and feathers and thus opened the story of electricity." In the time of Emperor Tiberius, Anthero, a freedman, who stepped on a torpedo (an electrified fish) at the seashore and was thus "freed of gout," inaugurated electrotherapy, without realizing that he did so. According to Colwell,[2] Dioscorides recommended shocks from the torpedo for the treatment of intractable headaches, and he was followed by Galen and Paul of Aegina (625-690).

Phototherapy. Heliotherapy has been known since the days of mythology. Aesculapius, the God of Medicine, was the son of Apollo, the Sun God of the Greeks. Temples were erected by the early Egyptians to Ra, their Sun God. The Israelites and the Philistines worshipped Baal as their God of Healing and their Sun God. Mithras was deified by the Persians as their Sun God. It thus appears that the ancients closely associated the sun with healing. Sun treatment, mentioned by Herodotus, was systematically practiced by Hippocrates. The Romans had open parlors, known as Thermae, in their homes. In the Greek houses, similar sun parlors were known as Helioses.

Thermotherapy. The Romans practiced thermotherapy. Their ancient "sweating houses" were the precursors of the modern Turkish bath.

Hydrotherapy. Kellogg writes,[3] "The Tokio Medical Journal (1881) states that the cold bath has been in use in Japan for nearly eight hundred years—and that nearly three hundred years ago a small treatise on the medical uses of the cold bath was published by Dr. Nakagami." "Among the Spartans of ancient Greece cold bathing was made obligatory by law. The bath in various forms is also frequently referred to in Grecian mythology. Hippocrates evidently had an excellent understanding of the physiological properties of water. Under the Romans the bath attained a very high degree of development. Emperors vied with one another in erecting magnificent public baths, capable of accommodating thousands of persons daily."

Exercise and Massage. The ancient Greeks were thoroughly familiar with various forms of corrective exercise. The games—of which the discus throw and the javelin throw are examples—which they developed for systematic bodily exercise are still played today. Nissen[4] states that, "Nature early taught the man to knead his flesh, or bend his body, to relieve him of certain ills. And there are books as old as three thousand years B. C. written about gymnastics, among them the Kong-Fu in Chinese. We also know that the Persians, Phoenicians and Egyptians knew about massage as well as gymnastics. The Greeks were the first to make a genuine progress, however, in this branch, as in so many others. Aesculapius, Apollo's descendant, is said to have been the inventor of the art of gymnastics. Medea procured health and youth by gymnastics. It was 400 to 500 B. C. that Iccus, and later, Herodicus, reduced bodily exercise to a system, and Herodicus made it a branch of medical science to preserve the health and cure diseases by use of gymnastics, and among his pupils was the famous Hippocrates."

The ancients knew of and used many physical agents in the treatment of disease. We, in modern times, have merely refined these methods of treatment.

PART II—PHYSICAL THERAPEUTICS PRIOR TO THE TWENTIETH CENTURY

Phototherapy. Interest in many forms of physical therapeutics seemed to wane during the "dark ages." These are well named the "dark ages," since light, even as a means of treatment of disease, was employed in so slight a measure that it seemed to have been almost completely forgotten. Mayer[5] mentions a few references to phototherapy, which was little practiced during this period. Among these, he notes that "Avicenna (980-1056) recommended sun baths"; that "Henri De Monville (1260-1320) used red light in small pox, a treatment which was passed on to him from the Arabians who in turn borrowed it from the Chinese." He finds no other interesting references until the eighteenth century. During this entire century, he finds only two which were of importance; both of these, however, were of considerable significance "particularly because of the employment of different ends of the spectrum." "Thomas Fiennus (1735) used the lens for cauterizing cancer of the lip with good results, of course employing the heat rays of the spectrum." At the opposite end of the spectrum are the ultraviolet rays, concerning which Walter Harris, in 1742, made a most interesting observation. He wrote of the value of ground up clam shells, "particularly those that have lain for a long time *in the sun*," for the treatment of certain diseases "now recognized as due to faulty calcium metabolism and accordingly responsive to ultraviolet radiation." About the middle of the nineteenth century, Ollier and Poncet, of Lyons, wrote on the sun treatment of tuberculous arthritis. Theobald Palm, an English physician, pointed out, about forty years ago, the fact that rickets is a shadow disease. In 1897, Finsen, a Danish physician, established in Copenhagen a "light institute" in which he performed many seemingly miraculous cures of tuberculous skin lesions and the like.

[1] Victor Robinson. In the introduction of The Story of Electricity by H. Goodman.
[2] Colwell. "History of Electrotherapy."
[3] Kellogg. "Rational Hydrotherapy."
[4] Nissen. "Practical Massage."
[5] Mayer. "Clinical Application of Sunlight."

Finsen and his followers, Maag and Brusk, gave the first strong impulse to the study of phototherapy, although other men had been using it for some time; namely, Rikli, of Austria; Lahmann, of Germany; Melander, of Sweden; and Sneguireff, of Russia. There were several investigators prior to the eighteenth century who contributd to our present knowledge of phototherapy. One of the most interesting of the early experiments was that of Isaac Newton (1642-1727), who, in 1666, demonstrated the various divisions of the visible spectrum by means of prisms. Shortly after this, Olaus Roemer (1644-1710), in the year 1676, discovered the finite velocity of light. Over a century after Newton's discovery of the divisions of the visible spectrum, Karl Wilhelm Scheele (1742-1786) discovered in 1777 that there were rays beyond the visible spectrum, at the violet end, which darkened silver chloride. In 1801, a German chemist, named Johann Wilhelm Ritter, repeated these experiments on freshly precipitated silver chloride and found the salt was darkened even more rapidly in space beyond the violet rays than in the area touched by the violet rays; thus were the ultraviolet rays discovered. In a very similar manner, Sir William Herschel (1738-1822), a German-English music teacher, while testing his thermometer in various divisions of the visible spectrum to see which was the hottest, conceived the idea of placing the thermometer beyond the ends of the visible spectrum. To his surprise, he found that there was an area beyond the red end of the spectrum in which the thermometer registered an even higher degree of heat than in the red area of the spectrum; thus were the invisible infra-red or heat rays discovered.

In 1801, Sir Humphry Davy (1778-1829) demonstrated the first electric carbon arc light.

Joseph von Fraunhofer (1787-1826) observed, in 1814, numerous dark lines in the spectrum, which he carefully charted. His work laid the foundation of modern spectroscopy.

In 1857, Jean Martin Charcot (1825-1893) stated that he believed erythema solare (sun burn) to be due to invisible chemical rays. In 1885, Paul Gerson Unna (1850-) showed ultraviolet rays were the cause of sun burn.

Electrotherapy. Following the use of shocks from the torpedo for the treatment of disease, Aetius (450), a Greek physician, recommended, as treatment of gout, having the patient hold a magnet. Again during the dark ages, little was said about electrotherapy, except that Paracelsus (1493-1541) maintained that the magnet had "power over the matter of all diseases." It was not until 1600, when William Gilbert (1544-1603) published his remarkable work "De Magnette" that genuine interest in electrotherapy developed. This book laid the foundation of our modern conception of electricity. From this time, there are frequent historical references to electrotherapy. Electricians of this age had nothing with which to work but small fragments of amber and sulphur. In 1621, Jean Baptiste Van Helmont (1557 to 1624), of Belgium, wrote "De Magnetica," in which he discussed "the magnetic cure of wounds." In 1660, Otto von Guericke (1602-1686), of Madgeburg, Saxony, constructed the first primitive static machine (a globe of sulphur on a rotating shaft, in a frame; his hands furnished the friction and the electricity could be carried away from the sulphur globe by means of a chain). In 1709, Francis Hauksbee substituted a glass globe for the sulphur one and used rods of amber to furnish the friction. Later, several glass globes were used and finally the glass plates which are used in the modern static machine were used. The actual demonstration of the electrical origin of lightning was established in 1749 by the distinguished Benjamin Franklin (1706-1790), "The First American Scientist," when he performed his well-known kite and key experiment. He was fortunate to escape with his life, for in 1753 George William Richman repeated this experiment and was instantly killed. It was Franklin who introduced the terms "positive" and "negative" electrification. Franklin used the charges from "Leyden jars" to treat disease. This so-called "Leyden jar" was discovered in 1745 by Von Kleist; but this discovery was little noted until the following year (1746) when Cuneus and Musschenbrock, of Leyden, unaware of the work of Von Kleist, made an independent discovery of the jar, which was thence known as the "Leyden jar." Electricity derived from Leyden jars was first used for the treatment of a medical condition in 1745, by Christian Krantzenstein (1723-1795), at Halle, who treated a woman suffering from a contraction of the little finger; after fifteen minutes, "the condition was reported as cured."

Jean Louis Jallabert (1712-1768) was the first scientific electrotherapist. He is known to have benefited some medical cases, and he was the first to produce muscular contraction by means of electrical sparks.

John Wesley (1703 to 1791), the founder of the Methodist church, and student in many fields, was much interested in electrotherapy, as well as in hydrotherapy. Wesley's "The Desideratum" (1759) was one of the earliest publications on electricity and electrotherapy in the English language. In 1770, Joseph Priestley (1733-1804) published his book "The History and Present State of Electricity." In 1773, John Hunter (1728-1793) studied the electrical organ of the torpedo. In 1791, Luigi Galvani (1737-1798), while working with frog nerve muscle preparations, found that they contracted violently when hung on an iron rail, but he was unable to give the proper explanation of this fact. It was Alessandra Volta (1745-1827), of Pavia, who, in 1793, explained this phenomenon; he showed that the contractions were due to electricity generated by the junction of two dissimilar metals. Volta, in 1800, designed "The Voltaic pile," the first primitive battery. In 1825, George Simon Ohm (1787-1854) propounded the law which has been given his name. Michael Faraday (1791-1867) discovered electromagnetic induction in 1831. It is the secondary current of his induction coil which is used in medicine today, and which has been named the Faradic current. In 1841, James Prescott Joule (1818-1889) published his studies on electrolysis; and, in the following year, 1842, Emil du Boise-Reymond (1818-1896) introduced faradic stimulation. (Each of these men propounded an electrical law which bears his name.) In 1855, Guillaume Duchene (1806-1875), of Boulogne, published his "De l'Electrisation Localisee," in which he classified electrophysiology. Colwell has termed him "The Founder of Modern Electrotherapeutics." It was Duchene who discovered that, by applying suitably moistened electrodes to the skin, he could stimulate individual underlying muscles. Robert Remak (1815-1865) substituted the galvanic for the faradic current in electrotherapy, in 1856. During the previous year, 1855, he had demonstrated the "points de l'election" for muscle stimulation. He showed that these points were on the skin surface immediately above the site of entrance of the various motor nerves. Hugo von Ziemssen (1829-1902) carefully charted these "motor points" in 1857. Some of his charts are still used today. The work of Duchene, Remak and Von Ziemssen has done much to aid us in our modern neurological diagnoses.

The first systematic work on electrolysis was published by Julius Althouse (1831-1900,) of London, in 1867.

In the previous year, 1866, he had performed the first electrolysis operation when he successfully removed a nevus. Dr. Michel, an American ophthalmologist, of St. Louis, in 1875 first practiced electrolysis for the removal of superfluous hairs. In 1878 S. Weir Mitchell wrote on the value of a slowly interrupted "induction current" in the treatment of disease.

In 1891, Nikola Tesla first suggested the use of the high frequency currents in medicine. The following year, 1892, Jacques-Arsene d'Arsonval introduced these high frequency currents. d'Arsonval showed that muscular contractions cease when the current frequency exceeds ten thousand oscillations per second. This number has since been taken arbitrarily as the dividing line between high frequency and low frequency currents. In 1893 Professor Oudin, in Paris, demonstrated the use of sparks from a monoterminal application of the high-frequency current in the destruction of superficial cancer. This method was called fulgubation. It was not, however, until the beginning of the twentieth century that the high frequency currents were actually introduced for their therapeutic action in raising local body temperature.

Thermotherapy. Luke[6] states that: "In 1840 Guyot issued his "Traite de l'Incubation," the first serious study on hot air and the employment of high temperatures for the alleviation of pain especially with reference to affections of the bones." "In 1844, Chautard, perceiving the value attaching to luminous radiant heat, strongly recommended its adoption in treating rheumatism." "In 1893 Tallerman demonstrated the possibility of attaining with dry heat temperatures unknown until then." The discovery of infra-red rays by William Herschel led to the use of these invisible heat rays in the treatment of disease. Later Tyndall's studies of the spectrum demonstrated the value of luminous heat rays in the treatment of disease.

Hydrotherapy: "Galen, Pare, Preissnitz, Winternitz, Brand and Baruch are milestones in the line of progress" of hydrotherapy, states Granger.[7] The names of Fleury and Kellogg might well be included in this list. Prior to the publication of his book on electrotherapy, "The Desideratum," John Wesley had written, in 1747, a booklet entitled "Primitive Physick," in which he discussed the use of hydrotherapeutic measures in the treatment of many diseases. According to Kellogg,[8] "Sir John Floyer, in 1697, published a history of cold bathing." He further states that "the modern popularity of water as a remedy must without doubt be credited to the enterprise and ingenuity of a Silesian peasant, Vincent Priessnitz, born in the little village of Graefenburg, in Austrian Silesia, in 1790".—"Attention thus attracted led to a careful study of the physiological effects of water.—Among the first to undertake this study was Fleury, who published in 1852 the first extended scientific treatise upon hydrotherapy, under the title, 'Traite Pratique et Raisonne d'Hydrotherapie.' Liebermeister, Brand and Ziemssen in Germany and above all (Wilhelm) Winternitz, of Vienna, reviewing, compiling and greatly extending the work of Fleury and other pioneers, have within the last half century built up a scientific hydrotherapy which is based upon definite and accurate data."

Exercise and Massage. The history of exercise and massage is well presented by Hartvig Nissen,[9] who is one of the pioneers in this field in the United States. Nissen states that "Mercurialis in the sixteenth century wrote a book, 'De Arte Gymnastica,' or the science of bodily exercise, which he divided into 'Gymnastics for Athletes for the Military and for the Cure of Diseases'." Thomas Sydenham (1624-1629) wrote, "If any one knew of the virtues of friction and exercise, and could keep this knowledge secret, he might easily make a fortune." In 1704, Clement Tissot, of France, published his "Gymnastic Medecinale." In 1812 Pehr Henrik (Peter Henry) Ling, of Sweden, after much labor, finally succeeded in placing massage and corrective exercise on a scientific basis. He can unquestionably be termed "The Father of Modern Massage." About the middle of the nineteenth century Dr. Douglass Graham, of Boston, wrote the first American book on massage entitled a "Practical Treatise on Massage." Shortly after this, the renowned S. Weir Mitchell,[10] in 1878, wrote on massage. He stated, "The two aids which by degrees I learned to call upon with confidence to enable me to use rest without doing harm are massage and electricity." In speaking of massage, Mitchell said, "I willingly give it a chapter of careful detail because as yet it is little understood in America.—I very soon found that I had in it an agent little understood and of singular utility." In 1889, Dr. D. A. Sargent and Baron De Posse, in Boston, began their work in physical education. They inaugurated the excellent system of physical education which has spread throughout the United States.

PART III—PHYSICAL THERAPEUTICS IN THE TWENTIETH CENTURY

Electrotherapy. Electrotherapy, like all other forms of physical therapeutics, has made exceedingly rapid strides in the twentieth century. The medical profession, frequently slow to adopt new methods of treatment, is apparently gradually awakening to the value of the use of physical agents in the treatment of disease. Great impetus was given to the growth of physical therapeutics by the World War. During and following the war, its extreme value, which was definitely established through its practice in the various army and reconstruction hospitals, obtained its universal recognition and its espousal by many civilian hospitals.

Max Karl Ernst Ludwig Planck (1858-), in 1900, devised the quantum theory. His work on thermodynamics and on radiation therapy has been of value to physicists throughout the world.

Ionization. In the same year (1900), Leduc, of Nantes, first employed the galvanic current for the introduction of medicinal ions into the body. Since 1913, his pupil, A. R. Friel, of London, has done much to establish "on a scientific basis the principles underlying the sterilization of suppurating cavities by driving in metallic 'ions' by means of an electric current."[11] This subject has been clarified largely through the efforts of W. J. Turrell, of England.

Galvanic Electricity. Among the twentieth century workers in galvanic electricity, the names of the late G. Betton Massey, of Philadelphia, the late Frank B. Granger, of Boston, and Elkin P. Cumberbatch, of St. Bartholomew's Hospital, London, stand out prominently. These men have done much to develop this phase of electrotherapy. In 1915, L. Lapicque presented his work on the measurement of time-intensity relations of electrical stimuli, before the French "Academie des Sciences." This study has been of great importance to all those persons attempting muscle stimulation.

[6]Luke. "Manual of Physio-therapeutics."
[7]Granger. "Physical Therapeutic Technic."
[8]Kellogg. "Rational Hydrotherapy."
[9]Nissen. "Practical Massage."
[10]S. Weir Mitchell. "Fat and Blood."
[11]Cahill, A. J. "Electric Ionization in Oto-Rhinology." Eye, Ear, Nose and Throat Monthly, Dec., 1928.

Static Electricity. At the very beginning of the twentieth century, William J. Morton, the son of the discoverer of anesthesia, described the static wave current, since often called the "Morton wave." Shortly after this, Frederic De Kraft instituted the "blue pencil discharge," a long soft static efflouve administered with a special electrode. William Benham Snow, of New York City, who has played a very important part in the development of static therapy, was, until his recent untimely death, probably its greatest exponent.

Faradic Current. Probably the most noteworthy advance in the use of the faradic current during the twentieth century was the development, during the world war, by Major Rowley Bristow, of the British Army, of a special technic for the stimulation of atrophied muscles, by means of a special faradic coil devised by Morton Smart.

High Frequency Currents. Although high frequency currents had been described and their clinical application suggested during the last decade of the nineteenth century, by Tesla, d'Arsonval and Oudin, it was not until the early part of the twentieth century that these currents were seriously used in the treatment of disease.

Medical Use—Diathermy. Nagleschmidt, of Berlin, is generally given the credit for the introduction of the high frequency currents in the treatment of disease. He called this treatment "Diathermy" (through and through heating), a very apt term for the medical use of the high frequency current, which gained universal adoption. Although Nagleschmidt had been developing diathermy for some time prior to 1907, this date is usually given for his introduction of this current. Stewart[19] states that: "Diathermy was first used in this country by Frederic De Kraft in the office of William Benham Snow, of New York, in the year 1906." "The first use of diathermy in hospital practice was in St. Bartholomew's Hospital, London, in 1909." At this time it was introduced into England by H. Lewis Jones. The medical use of high frequency currents in this country has been advanced by the work of De Kraft, Granger, Stewart, Sampson, Grover, Snow and Titus. Stewart is especially known for his work with diathermy in pneumonia.

Surgical Use—Endothermy. In 1907, E. Doyen presented before the French Surgical Congress a method for destroying accessible cancer, by means of the biterminal application of the high frequency current. He termed this method "Electrocoagulation." A few years later, in 1910, William L. Clark, of Philadelphia, devised a method for the destruction of superficial growths by means of the monoterminal application of the high frequency current with a fine needle inserted into the tissues. He was able to destroy tissue by dehydration and, therefore, called his method "Electrodessication." In 1921, Cumberbatch described the use of a blade-like active cutting electrode with the d'Arsonval high frequency coil, which he named "Surgical Diathermy." Following this, in April, 1924, George A. Wyeth, of New York City, developed an undamped high frequency current which he utilized for cutting purposes. He designated this apparatus "The Endotherm Knife." Wyeth, desiring to avoid confusion between surgical and medical diathermy, has suggested the term "Endothermy" for all the surgical applications of the high frequency current, hence the appellation, "Endotherm Knife." Since radio tubes are utilized in the production of the undamped high frequency current which is used for cutting purposes, W. L. Clark has suggested the name "Radio Knife." Howard Kelly, of Baltimore, an enthusiastic user of the cutting current, has suggested the name "Acusector" (acu, with a needle; seco, I cut). Bovie has also devised an apparatus which provides a cutting current, which is commonly known as the "Bovie Knife." The rapidly growing interest in the surgical use of the high frequency currents bodes well for its future development.

Phototherapy. In 1901, the Cooper-Hewitt mercury vapor-arc was perfected. Since this was enclosed in glass, which absorbed the ultra violet rays, its therapeutic value was not then recognized. Bernhard, of St. Moritz, in 1902, used sunlight in the treatment of suppurating and indolent wounds, and announced the favorable action of the sun's rays in such conditions. He, however, applied the sun only to the affected parts. It was A. Rollier, of Leysin, who, in 1903, first introduced a systematic method for the application of sun's rays to the whole body. Rollier, "The Father of Modern Heliotherapy," confined himself to the treatment of the extra pulmonary forms of tuberculosis with sunlight. Following this Sir Henry Gauvain, of England, developed a radiation clinic, in which he used not only sunlight, but the mercury vapor quartz arco and carbon arcs, also infra red and radiant heat lamps, in the treatment of various diseases. In 1903, Sir Joseph J. Thompson, Professor of Physics at Cambridge, discoverer of the Electron, cited the difficulties concerning the wave theory. In 1904, the quartz enclosed mercury vapor arc lamp, which had first been developed in the Westinghouse-Hewitt Company laboratories, was used by Kromayer for the clinical application of ultra-violet rays. A few years later, a water-cooled mercury-vapor lamp was devised, which bears Kromayer's name. In 1905, a carbon filament lamp for the clinical application of ultra-violet rays was invented by W. R. Whitney. In 1911, Escherich, in Vienna, and Kisch and Bardenheuer, in Germany, published their findings on Heliotherapy. In this country, Pryor & Lo Grasso, of Perrysburg, New York, and Hyde, of Akron, Ohio, have taken up the study of Heliotherapy. In 1918, Kurt Huldschinsky first recommended the use of artificially produced ultra-violet light in the treatment of rickets. In 1924, Millikan and Bowen bridged the gap between x-rays and light rays. By careful spectroscopy, Millikan, who had photographed the ultra-violet spectrum, was able to span the distance between the shortest ultra-violet rays and the longest x-rays.

Thermotherapy. The use of thermal agents is intertwined with the other forms of physical therapeutics. During the twentieth century, advances in other fields caused increased efficiency in thermotherapy. The greatest natural source of heat is, of course, sunlight, the largest percentage of the sun's rays being infra-red rays. Hence, with the advances in heliotherapy mentioned above (under Phototherapy), thermotherapy also was raised to higher levels. With the development of easily controlled heat coils, and the growth of various forms of hydrotherapy, the latter largely due to the efforts of Simon Baruch, of New York City, the application of conductive heat has much improved. The application of cold, as well as heat, has been placed on a scientific basis with the development of hydrotherapy. Since the discovery of "medical diathermy," the production of conversive heat in the deeper structures of the body has been rendered possible. Practically all this work has been accomplished in the twentieth century. In addition, interesting studies have been made in the use of convective heat. In the early part of the century, Tyndall, in England, studied the spectrum and demon-

[19] H. E. Stewart. "Diathermy with Special Reference to Pneumonia." Hoeber, 1926.

strated that heat rays became more intense as they gained greater proximity to the luminous rays. Following Tyndall, Bain, of Harrogate, demonstrated experimentally that he could obtain a much greater rise in local temperature from a source of luminous heat than he could from a non-luminous source. Later, Coblentz, in America, showed with absorption spectra of protoplasm for infra-red energies that the shorter wave lengths penetrate more deeply than the long waves. The longer waves were reflected from the body and caused more superficial heating. The United States Bureau of standards demonstrated that the luminous sources of radiant energy emitted a larger number of short infra-red rays than the non-luminous infra-red generators. It was, therefore, shown that there is deeper penetration of heat from luminous sources than from non-luminous sources of infra-red rays.

Hydrotherapy. J. H. Kellogg, in 1901, published his book "Rational Hydrotherapy." In 1903, S. Baruch, of New York City, published "The Principles and Practice of Hydrotherapy," which greatly aided the systematizing of hydrotherapeutic treatments. It was about this time that Baruch devised his "douche table," which has become standard equipment in practically all modern hydrotherapy departments. Winternitz continued his work into the early part of the twentieth century, developing and perfecting hydrotherapeutic technic. In 1920, Baruch published his "Epitome of Hydrotherapy," in which he made a final plea for the careful application, by physicians, of hydrotherapeutic measures. Probably the greatest advance in hydrotherapy during the twentieth century was the development, during the World War, of the whirlpool baths. Since the war, they have become probably the most valuable pieces of hydrotherapeutic equipment in the various civilian physical therapy clinics. The whirlpool baths, which were developed in France, were adopted in modified form by English and American hydrotherapists. A very good form of whirlpool bath was devised by Army physicians at the Walter Reed Hospital, in Washington, D. C. Dr. Norman Titus, of the Vanderbilt Clinic in New York City, also has recently invented an ingenious portable whirlpool bath, in which the water is agitated by means of a small, motor-driven wheel, similar to those seen in certain types of washing machines.

Mechanotherapy. C. E. Beevor and C. S. Sherrington, of London, laid the foundation of modern *muscle training.* This work was extended by the late Robert W. Lovett, of Boston, and his associates, who developed the "Lovett system" of muscle re-education, without the assistance of mechanical apparatus. Zander developed a system of mechanotherapy, utilizing various pieces of apparatus. This method was later simplified by R. Tait McKenzie, of Philadelphia. In 1918, E. G. Brackett and Joel Goldthwait organized the Reconstruction Department of the United States Army. In the "Physiotherapy Division" of this Department, hundreds of "aides" were trained to administer treatments under medical supervision. The workers, lay and medical, trained in the Army Reconstruction Department, have scattered throughout the United States, and they have given great impetus to the development of this most fascinating branch of medical treatment. Their work has been of great value in systematizing massage and therapeutic exercise. This history would be incomplete without a word of praise for the tireless workers in this group who labored so valiantly and so successfully to restore the thousands of maimed soldiers to some semblance of normality. The harassed Army physicians, finding ordinary methods of no avail in the treatment of these unfortunate sufferers, turned to the physical therapy department, where they found workers willing and able to accomplish what was required. It is no wonder, then, that physical therapy has extended throughout the country until there are now over two thousand hospitals operating well-equipped departments.

York Road, Philadelphia.

Officers and Executive Committee of the American Physiotherapy Association, 1930-1932

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All changes of address must be sent to the Secretary, Treasurer, Director Bureau of Appointments and General Manager of the REVIEW. This will assure delivery of important notices and of the magazine. No second class mail is forwarded.

EDITORIALS

A Second Call to the 1931 Convention

The Tenth Annual Convention is only two months away!

To those of us who are the present members of this association it is a privilege to be founders and guardians of an interest which we know has unlimited possibilities for many years to come.

Just so long as man shall have physical handicaps with which to contend, Physiotherapy will stand as one of the beams of the beacon *Health and Happiness* which guides him to the ultimate goal, *Life Lived to its Fullest.*

Thinking in terms of decades, many of which we hope will be allotted to the activities of The American Physiotherapy Association, it is fitting that the first decade of its life should show some decided growth in usefulness, breadth of thinking, and strength of purpose.

A year ago our convention challenge was to "further the interests of Physiotherapy," a great inspiration to those who find greater satisfaction in working for the cause than for individual gain. Have we as individual members unselfishly endeavored to further this interest?

For the benefit of many who may have been too busy to refer often to the purpose for which we are bound together, the Constitution is quoted here:

Article II. The purpose of this Association shall be:

a. To form a Nation-wide organ which will establish and maintain a professional and scientific standard for those engaged in Physical Therapy.

b. To promote the science of Physical Therapy by co-operating in the establishment of standardized schools of Physical Therapy and encouraging scientific research in the profession.

c. To co-operate with or under the direction of the medical profession and to provide a central registry which will make available to the medical profession, efficiently trained assistants in Physical Therapy.

d. To provide a bureau of information which will be available to members of the medical profession and the general public as well as to the members of the Association.

e. To bind the local chapters together.

There is no requirement made here of the Association as a whole to which the individual member as well as the local chapter cannot pledge themselves to uphold in the interests of Physiotherapy.

A discussion of this article of the constitution will be the business of the coming convention.

We work and play together at our annual meeting for there are social gatherings as well as business sessions.

The Executive Committee urges all the members who can, to come to Philadelphia in June with their helpful suggestions for the year ahead.

In pleasant anticipation of our meeting,

EDITH MONRO, President.

By this time most of you have started your "Convention Account" and planned your "Convention Wardrobe" and are only waiting for the right and proper time to start for the "Convention City," Philadelphia. I am free to confess that as the reports from the different program committees and the cordial replies from the speakers come in I can hardly sit quietly by and wait for time to pass.

Railroad rates will be as usual—a fare and a half—but must be applied for at the time of buying the ticket to Philadelphia. The slip must be signed by the local ticket agent and then countersigned at Philadelphia by the appointed A. M. A. officer. Do not fail to follow this procedure if you wish to avail yourself of the reduced rates.

You have received a list of hotels and I hope that you will not delay in making your reservations, for anyone who has been to a convention city knows what a task it is at the last minute to find a place to stay.

Our new official uniforms and insignia will be on display. In fact there are so many reasons why we should all go to this our Tenth Convention that it will be hard to find reasons strong enough to keep us away.

E. J. G.

Program*

Tenth Annual Convention, American Physiotherapy Association, Pennsylvania Hotel, Philadelphia, Pa.

MONDAY, JUNE 8

4-6 P. M. Registration Tea
8 P. M. Address of Welcome.....Dr. Krusen
The Growth of Physical Therapy

*Subject to changes and additions.

Papers by Members of the A. P. A.—
Miss ——— ——— ..... Pennsylvania Chapter
"Some Phases of Massage and Exercise"
Miss Josephine Rathbone.....New Jersey Chapter
"Methods Used to Gain Relaxation"
Miss Louisa Lippitt.....Washington, D. C., Chapter
"A Report on Some Experiences in Rehabilitation in Encephalitis"

TUESDAY, JUNE 9

9:00 A. M. Business Session (Old Business)
1:00 P. M. Inspection of Institute for Mental Hygiene. Clinic at the Institute with papers by Dr. Patton and Mr. Holmes who will discuss the Practical Application of Physical Therapy in Mental Hygiene Cases.
3:30 P. M. Bus trip to Valley Forge and dinner. Evening free to explore Philadelphia.

WEDNESDAY, JUNE 10

9:00 A. M. Business Session (New Business)
12:30 P. M. Officers' Conference and Luncheon.
Visits to Hospitals and Clinics, Orthopaedic Section of the A. M. A.
3:30 P. M. Clinic at the Home of the Merciful Saviour.
Demonstration of work with children in pool.....Miss Moyer
Paper .....Dr. Wagoner
8:00 P. M. Orthopaedic Section
The Treatment of Certain Surgical Conditions (film).....Dr. Corbusier
The Proper Place of Physical Therapy in Fracture Treatment.....Dr. Murray
..... Dr. Gill

THURSDAY, JUNE 11

9:00 A. M. Round Table on Department Administration .....Miss Beard
Relation of Physical Therapy Department to the Entire Organization.....
..... Ann Kelley
Discussion
Medical and Surgical Staff..Heler Kaiser
Nursing Staff .....Ruth Babb
Occupational Therapy Department.....
.....Emma Litzenberg
Social Service Department....Ruth Dupee
Equipment and Arrangement of Floor Space .....Edna Griswold
Discussion
Hospital Departments .....
.....Mrs. M. L. Kelland
Teaching Centers.....Emma Vogel
Private Office.....Hazel Furscott
Industrial and Other Clinics.....
.....Agnes Sussdorff
Departments of Educational Institutions .....Helen Foss
Assignment of Personnel to Work.....
.....Mrs. Cleveland
Discussion
Mathea Boxeth, Ruth Johnson
Patients Daily Records.....
.....Dorothea M. Beck
Discussion
Hospital Departments.....
..... Earnscliff Musgrove
Teaching Centers.....Mabel Holton
Private Offices.....Marguerite Irvine
Industrial and Other Clinics.....
.....Philadelphia Chapter
Departments of Educational Institutions .....Detroit Chapter
Methods of Measuring and Recording Joint Movement.....Margaret Campbell
Discussion
Mildred Elsom, Boston Chapter
1:30 P. M. Electrotherapy Section
Indications for Electrotherapy with Emphasis on Electro-Physics (slides)
.....Dr. Resnik
(Slides) .....Dr. Ellison
Therapeutic Use of Low Voltage Currents .....Dr. Peck
7:00 P. M. Dinner, Dr. Coulter presiding. Miss Monro, Miss Windle, Dr. Wilcox.

At the present time it is almost necessary for a candidate for a position as physiotherapist to be equipped with a college degree. It is the policy of public school systems making provision for classes for crippled children, also university hospitals, and teacher training colleges, to refuse to appoint those who have as a background their professional training only. Physical education is usually required as a prerequisite for physiotherapy training, and we all know how essential this preliminary training is to the individual who later intends to take up the study of physiotherapy as a profession. The courses in anatomy, physiology and kinesiology given in physical education schools are the very foundation on which physiotherapy specialization is based. However, a foundation of general education, in addition to physical education and specialization in physiotherapy, is considered indispensable for a well rounded physiotherapist. The knowledge of the profession itself is no longer sufficient, one must also have the judgment, vision and understanding of life that comes only with a liberal education. Unfortunately many capable physiotherapists have failed to realize the importance of this, and consequently have been barred from worth while positions because of a deficiency in general education.

The necessity for a university degree seems to be a step forward for physiotherapy, for does it not indicate that the profession is moving from a subordinate to a more central place among the professions of the highest standing?

Let us try to impress on those who are considering the study of physiotherapy as a vocation, the importance of a cultural education along with their professional training, so that there may be ready competently trained physiotherapists, with the necessary general education, to meet the requirements of university and public school demands.

A. L. M.

Physical Therapy and the Student Nurse

A short course in Physical Therapy is essential with the usual Student Nurse's Training.

At least eight to ten weeks of training is advocated in this department.

Training under direct supervision of the Technicians, the endeavor is to give the student nurse sufficient training to assist in the nursing care as and after completion of their training.

It has been found that a nurse is more eligible in securing suitable positions in small hospitals and as Doctor's assistants where some knowledge of physical therapy

is required whereas a full time technician is not so essential.

The student should be impressed as to the value of each treatment and the importance of administering it to the patient properly.

The student works under the supervision of the technician in giving Ultra Violet Treatments, Sun Lamp, Infra Red and the various light treatments, Baths, Hot Packs and other available Hydro Therapy Treatments and simple Electric Therapy.

A short course in massage should be included which is of value to the nurse in the general care of patients and especially beneficial in Orthopedic cases.

Physical Therapy has appropriated a large field in the care and treatments of patients, therefore, some training in Physical Therapy plays a great importance in the training of the Student Nurse. R. M.

The following, which comes from the District of Columbia Chapter, is of great interest and importance to the other chapters and legislative committees:

"I am enclosing a copy of the bill which was presented a short time ago during the present session of Congress. As stated in the bill it was passed by the House of Representatives, read twice before the Senate, and referred to the Committee on the District of Columbia, who in turn referred it to the Washington Chamber of Commerce for consideration. The Health Committee of the Washington Chamber of Commerce asked me as president of the local chapter of the American Physiotherapy Association to be present at a meeting and to express my views and those of the organization relative to the passage of this bill. I am enclosing herewith a copy of my report which I read before the meeting of the Health Committee of the Chamber of Commerce. Later that same day I conferred with the Senate Committee on the District of Columbia and learned that the bill had been dropped in the Senate Committee and would not be presented to the Senate. . . . .

"I am enclosing a definition of Naturopathy which was written by the Commission of Licensure and which was accepted by the Naturopath. It would seem to me that the greatest problem confronting the American Physiotherapy Association today is—this type of practitioner. Signed: Emma E. Vogel, President District of Columbia Chapter, A. P. A."

H. R. 12169

71st Congress, 3rd Session, in the Senate of the United States, January 26 (calendar day, February 9), 1931, read twice and referred to the Committee on the District of Columbia, an act to amend the meaning and intention of an Act of Congress entitled "An Act to regulate the practice of the healing art to protect the public health of the District of Columbia," approved February 27, 1929.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That nothing in the Act of Congress entitled "An Act to regulate the practice of the healing art to protect the public health in the District of Columbia," approved February 27, 1929, shall be construed to authorize the Commission on Licensure provided for in the said Act to make, or to give, or to require, any applicant for license to practice as a naturopath in the District of Columbia to make or give any definition of the character and limits of the method of healing to be practiced by him or her as a naturopath. The object and intent of this Act is to require that the aforesaid Act of Congress, approved February 27, 1929, shall be construed to mean that "naturopathy" as a branch of the healing art is placed upon the same basis as medicine, osteopathy, and chiropractic, that the said Act of Congress means, and shall be construed to mean, that the term "naturopathy," as used therein, is self-definitive to the same extent as are the terms "medicine," "osteopathy," and "chiropractic," that no applicant for license to practice naturopathy under the said Act of Congress is required, in making application for such license, to give the character and limits of the method of healing practiced by him or her as a naturopath; nor shall the Commission on Licensure make, give, or establish any definition of the character and limits of the method of healing to be practiced by naturopaths.

Sec. 2. It is further enacted that "naturopathy," as used in the aforesaid Act, approved February 27, 1929, hereafter shall comprehend, embrace, and be composed of the following acts, practices, and usages: Diagnosis and practice of physiological, mechanical, and material sciences of healing as follows: The physiological and mechanical sciences such as the mechanotherapy, articular manipulation, corrective and orthopedic gymnastics, neurotherapy, psychotherapy, hydrotherapy, and mineral baths, electrotherapy, thermotherapy, phototherapy, chromotherapy, vibrotherapy, thalmotherapy, and dietetics, which shall include the use of foods of such biochemical tissue-building products and cell salts as are found in the normal body; and the use of vegetal oils and dehydrated and pulverized fruits, flowers, seeds, barks, herbs, roots, and vegetables uncompounded and used in their natural state.

Passed the House of Representatives February 7, 1931.

Attest: WM. TYLER PAGE, Clerk.

DEFINITION OF NATUROPATHY

Naturopathy, a system of drugless healing, is defined to be in the practice of the healing art the use of such physical forces as air, light, water, vibration, heat, electricity, hydrotherapy, psychotherapy, physiotherapy, dietetics, massage, corrective and orthopedic gymnastics, Swedish movements, and the use of herbs and other vegetable products in their natural form: Provided, That the term "herbs" shall be meant to include only the following: mint, thyme, caraway seeds, sage, cassia, ginger, nettleflowers, yarrow, raspberry leaves, dandelion, burdock, peppermint, fennel, mullein, rosemary, anise, linden leaves, buckthorn bark, licorice, sweet marjoram, culvert roots, gooseberry leaves, senna leaves, slippery elm, lobelia, colver, figwort, chickweed, horehound, hops, boneset, elder flowers, hyssop, Iceland moss, sarsaparilla root, wild cherry bark, coughwort, golden seal, sassafras, bay leaves, marshmallow root, catnip, camomile flowers, coriander seeds, cornflowers, dill, arrowroot, asparagus, wormwood, wild-carrot, witch-hazel, alfalfa, mallow flower, dandelion flowers, mullein flowers, Irish moss, dulce, agar agar, squaw vine, eyebright, sandalwood, buckbean leaves, capsicum, chicory, celery seed, cottonweed, cloves, dandelion root, flaxseed, mountain flax, Indian turnip, licorice root, parsley root, celery root, pumpkin seed, beet-top greens, watermelon seeds: Provided further, that Naturopathy shall not include palpating, analyzing, and adjusting the articulations of the spinal column, surgery, or the application of X-ray or radium.

The District of Columbia Chapter of the American Physiotherapy Association opposes the passage of H. R. 12169, 71st Congress, 3d Session for the following reasons:

For years the American Physiotherapy Association (recognized by the American Medical Association) has been fighting to raise the standards of Physiotherapy. There are still many attempting to practice Physiotherapy

without the necessary training or other requirements. The standards of Physiotherapy as defined by the constitution of the American Physiotherapy Association, and recognized by the American Medical Association are herewith stated:

The American Physiotherapy Association defines Physiotherapy thus: the treatment of disease by various non-medicinal measures, comprising the use of physical, chemical and other properties of heat, light, water, electricity (except Roentgen Ray and Radium) massage and therapeutic exercise. The constitution definitely states that all members of the American Physiotherapy Association shall administer these treatments only under the prescription and direcion of a licensed physician.

Active membership in the Association shall be confined to those engaged in the practice of Physiotherapy as defined by the constitution—Active membership is furthermore confined to those having had one year's practice in Physiotherapy in addition to 1—graduation from an approved school of Physiotherapy, or 2—graduation from an approved school of physical education and satisfactory completion of an approved course in Physiotherapy, or 3—graduation from an approved school of nursing and satisfactory completion of an approved course in Physiotherapy.

In this bill no statement is made relative to the educational or professional requirements for a Naturopath. It would seem the gate is wide open for the quack.

The American Physiotherapy Association believes that the practice of naturopathy as defined in H. R. 12169, 71st Congress, 3d Session encroaches on the practice of Physiotherapy and that the passage of this bill would lead to a perceptible expansion of non-ethical activities in the practice of Physiotherapy, and would be a detriment to the standards of the profession of Physiotherapy as well as to the Medical profession as a whole.

EMMA E. VOGEL,
President, District of Columbia Chapter, American Physiotherapy Association.

We have long tried and now gladly present the following "effluve" which was read at the banquet of 1930, by "The Layman":

THE LAYMAN'S LAMENT

Ladies and gents, behold in me
One of a great fraternity—
Greater than Elks or Moose or Oddfellows,
Greater than Sears & Roebuck-shod fellows.
Greater than digger of ditch or Mason—
He who tips the waiter or tips the basin,
Greater than Red Men of high degree
Or the black men's Mystic Knights of the Sea.
Greater than Loyal Sons of Draymen—
I refer to the Lowly Order of Laymen.

When the layman's automobile breaks down
His brow is gloomed with a futile frown,
And he lifts the hood with a helpless air
At last the Expert he goes to seek,
The Expert with generous quid in his cheek,
Says the Layman in accents chicken-hearted,
"The runk-tum and skoo-jum seem to have parted."
The Expert expertly expectorates,
And expertly squints and estimates,
Hits the runk-tum a blow and the skoo-jum a whack,
And the layman humbly parts with his jack.

The layman knows naught of theology,
Or whether St. Peter holds Heaven's key.
He sidles away from sect and schism
And from scraps over Fundamentalism.
Unlike the preachers, he isn't sure
Of the tortures of Hell, and its temperature.
The preachers can pick the devout from the gay man,
But sinner and saint look alike to the layman.
He may not know much about sanctification,
But he sidesteps Senate investigation.
The priest gives the Lord a familiar nod;
The layman walks humbly with his God.

The layman, when doctors disagree,
Lies still in meek humility.
And if they don't settle their argument,
He goes the ways that his fathers went.
And he's never missed, for in every case
A million are waiting to take his place.
The layman, sad to relate, is very
Limited in vocabulary.
I'm afraid he would be little the wiser
If told he had a bad coryza.
And the terms he would use for pediculosis,
Locomotorataxia and scoliosis,
Are exceedingly less tongue-twistin's and taxin'
And much more pungently Anglo-Saxon.

And so as a Knight of the Laity,
I salute Physiotherapy.
I shall doubtless be dazzled into dismay
By a blinding pyrotechnic display
Of quip and quirk and persiflage,
And jesting and banter and badinage,
And talk of tapotement and effleurage,
Vibration and friction and petrissage.
Mrs. Dinieus, as a matter of fact,
You're a woman of uncanny skill and tact,
For I shouldn't have come here at all to-day,
If you hadn't rubbed me the proper way.

By the Way:

We hope you have noticed and been properly impressed with our new and copyright insignia which appears for the first time on the cover of this issue. It surely brings back memories of the sunlit room at the convention in Detroit when watercolor designs were circulated among those present. The pin, in all its glory of blue and gold, may be purchased shortly from Filene's in Boston. It is larger and consequently more distinctive than the original one. May we wear it proudly and honorably as the symbol of our organization and true service.

The Executive Committee has appointed one of its members—Miss Pauline Mansfield—as its working chairman for its special work on membership problems. It is therefore requested that chapters, when forwarding their membership forms for special consideration, direct them to her at 20 Maple Street, Springfield, Massachusetts.

A recent note from Miss Woodcock carries her paper on "Coordination Exercises Under Water, in the Treatment of Spastic Paralysis Following a Spine Fracture" a little farther. She says that the patient was able to walk up two flights of stairs with a very little help. Those who were interested in that paper and case will say "Bravo" to the success of the treatment and "the grit and determination of the patient himself."

By some oversight a footnote was omitted from Miss Julia Tuggle's paper on "What is a Physiotherapist?" which appeared in the January-February issue of the REVIEW. This paper won the third place in the contest of last year.

A Regime of the Physical Care of Dowling School Children

By Helen S. Foss, P.T., Harriet B. Gass, Physiotherapy Educational Instructor

A child living in Minneapolis, who is physically and mentally qualified, is entitled to attend Dowling School. The two types of cases represented here are the severe Cardiac and Orthopedic.

Application blanks are first filled out by the parents and sent to the "Special Department" of the Board of Education, where appointments are made for the physical examination and the mental test. The former is made by the Orthopedic Surgeon or Cardiac Specialist, and the latter by the Psychologist, all of whom are employed by the Board of Education. A child with an I. Q. below 70 is not eligible; those with an I. Q. of 70-85 are placed in the Subnormal class and all others are placed in the grade where they belong.

Each physician spends one morning a week at school. The cardiac cases have their temperature and pulse taken daily by the school nurse and a weekly record of their weight is kept. A dental survey with recommendations for correction is made once a year. Transportation to and from school, a warm lunch at noon, a period of rest under supervision, lamp treatment when recommended, Physiotherapy, Physical Education (which includes the corrective work, teaching children to walk as many of these cases are Spastics, coordinate classes, rhythm, etc.), treatments in the tank once a week and teaching all Infantile Paralysis cases to swim, Occupational Therapy two days a week; and Speech Correction three half days weekly, sum up the care of the children at Dowling School.

It is almost impossible to give a definite set of exercises for a Spastic case as so much depends upon the extent of the brain injury. And equally important is the cooperation of the parents carrying on the exercises at home. The majority of the parents have accepted our suggestions in allowing the child to have their own room and to sleep alone. Nearly all of these children have had so much done for them at home that they have lost desire and interest to do for themselves. Their initiative has been smothered. Every effort is made at school to train the children to become independent as soon as possible. Desk-chairs have been made to fit them and they are able to carry on their school work in an easy comfortable position. Row-cycles are used for their transportation until they are ready to walk alone. The Row-cycles have the pedals adjusted for the individual and some have a back support added.

I am sure that everyone realizes that it is a long slow process to notice a change with this type of case. The period of improvement goes over a long period and it is most gratifying to see children walking alone, even though it has taken years, for some, to reach the goal.

The corrective exercises are grouped into four classes according to the child's disability.

Class 1: These are cases with extreme athetoid movements. Spasticity is great in both arms and legs and it is impossible to keep both feet on the floor. Relaxation and breathing exercises are first taught in a lying position, preferably on a bed, or table, or in the water. Not until complete relaxation is accomplished does the child begin the next step in progression. In a lying position, assistance is given with slow flexion and extension abduction, etc., of both arms and legs. Exercises in a sitting position follow and finally the child begins standing. Each exercise is given eight times; the child now correlates his Speech Correction by counting each exercise with the instructor.

Class 2: These cases are able to do the above work without assistance and walking is added. Many of them need to have their fingers fastened around the crutch handles or a splint applied to the arm to keep the wrist and elbow in extension in order to handle the crutches properly. The child's weight is carried at first by a rope fastened high above his head. From a pulley on this rope, another rope is fastened to a belt which is placed around the child's body, under his arms. He is taught how to place his foot, then the crutch, and gradually he is able to go along on this rope without any help. Individual walkers equipped with a suspended saddle are of great value on the playground and the child is encouraged to go out in the walkers at recess.

Class 3: This class consists of children who have gained in muscle power and can balance alone on crutches but they need to continue with such exercises as: outward rotation of the legs, arm exercises in two directions, and coming up to a sitting position.

Class 4: Children who have a very moderate degree of spasticity or those who have had operative work done find the following exercises very helpful. Any number of rhythmical combinations may be added later.

List of Exercises:

1. Standing facing the stall bar. Both arms straight, hands holding bar, head erect and knees straight. Ex: Raise toes on count 1, lower on 2.
2. Same as above. Feet together. Ex: Bend knees on 1 (keeping heels on floor) straighten on 2.
3. Lying position, relaxed. Deep breathing, with abdomen relaxed on inhalation, contract on exhaling.
4. Lying position as 3. Raise left arm sideways to shoulder height on 1, lower on 2. Same with right arm, then both together.
5. Same position as 3. Raise left arm forward upward, with fingers, wrist, and elbow straight. Repeat with right arm, then both together.
6. Same position as 3. Raise head from table with counting. Raise on count (1), lower on count (2).
7. Same position as 3. Knee bending to chest on count 1, lower slowly on 2.
8. Sitting position. Elevate shoulders on 1, lower on 2.
9. Sitting position. Raise arms forward upward, stretching tall and lower with counts.
10. Sitting position. Leg extension, first singly then both together.
11. Rotate shoulders. Forward count 1, upward count 2, backward count 3, lower count 4.

When child can perform these exercises perfectly, they progress to the following:

1. Standing facing the stall bars, holding the bar chest high and feet flat on the floor. Flexing the arms, chest the bar on count 1 return to position on 2.
2. Standing erect, hips firm or arms lifted sideways. Knee bending on 1, stretch on 2.
3. Sitting. Combinations of arm exercises.
4. Sitting head bending forward, sideways and backward with counts.
5. Hands on hips. Trunk bending forward.
6. Standing. Stride stepping with counts.
7. Standing. Touch step, forward, sideways and backward on counts.
8. Standing. Combinations of steps.

A new classroom has been opened this term for the severe Spastic and Ataxia cases of normal intelligence. The children have been placed in their own grades and will advance as rapidly as they are able to. The instruction will be more individual, with special attention being given to the development of hand and conversational powers.

Some children who entered school two and three years ago are now walking alone on crutches. One boy who was grouped in class one has learned how to relax and can now get in and out of his Row-cycle to his desk with very little help. Their independence is as much a step in their mental progression as in their physical.

The Gillette State Hospital for Crippled Children, St. Paul, Minn.

By Marian Denny

The Northwest is associated in most of our minds with the brave pioneers and in the above hospital we have just another example of pioneer work, for Minnesota was the first state in the Union and more than that, the first government in the World to provide care, treatment and educational privileges for those crippled children whose parents are unable to do so.

In 1897 through the untiring efforts of Dr. Arthur J. Gillette, for whom this hospital is named, the Minnesota State Legislature granted an annual sum of $5,000 which enabled a small number of patients to be cared for at the City and County (which is now the Ancker) Hospital, St. Paul.

From this small beginning has grown the present hospital of 250 beds and an Out Patient Department of 28,000 patients.

This building, opened in 1911, is situated on 23 acres adjoining Phalen Park—the wards are all on the ground floor with French windows opening on to cement platforms enabling patients' beds to be wheeled out when weather permits.

Only children are eligible who can be helped by hospital treatment, whose parents have been residents in the State of Minnesota one year previous to application and are unable to pay for private treatment.

Children are admitted during minority so the patients vary from babies a few days old to boys and girls of eighteen.

Braces and apparatus are provided and there is no cost to parents except the expense of bringing the children to hospital and fetching them when discharged and providing necessary clothing.

The cases are mainly orthopedic for admission but treatment is given for any other condition they may have.

A medical and surgical staff of 45 of the foremost specialists of St. Paul and Minneapolis are on call at all times and their services are entirely gratuitous and unlimited.

The hospital has fulfilled the requirements of the American College of Surgeons and has been in Class "A" since 1922 when it was first inspected by them.

While in hospital all patients receive instruction in the School Department. A beautiful educational building is provided for those able to be up and instruction in the wards for those in bed.

The Educational Department is fully accredited, children take the State Board Examinations for grade and high school credit. The Art and Occupational Therapy Departments correlate with the library and general school.

The Physiotherapy Department like the hospital has grown since it was started in 1919, from one treatment room to two treatment rooms, one for boys and one for girls equipped with tables, electric bakers, etc. A swimming pool was donated in 1927. Two four-lamp Solariums have recently been completed. There is also a separate department for out-patients.

At present Scoliosis leads the list in treatments particularly on the girls service, Infantile Paralysis coming second.

The swimming pool donated "for the pleasure and comfort of the patients" is used also for treatments and has besides giving endless pleasure, proved very beneficial.

We find Scoliosis cases have benefitted greatly by swimming. Three children unable to swim on entering the hospital have won their Junior Life-Saving badges.

The following figures will give some idea of the growth of the department: July 1st, 1922, to June 30th, 1923—7,687 treatments; July 1st, 1929, to June 30th, 1930—39,786 treatments.

This covers all types of treatment including heliotherapy (transferred to this department in 1926) and swimming lessons in the pool given three times a week by a special instructor.

In 1922 the staff consisted of two trained physiotherapists and student nurse. In 1929-1930 four trained physiotherapists, three student nurses and three maids.

The Chicago Public Schools' Experiment in the Education of the "Spastic Child"

By Mabel C. Smart

A professional woman in one of her books relates the following incident and draws from it an interesting analogy concerning the learning processes. To those who know the "spastic" child it presents a perfect picture of his social discomfort—a discomfort that amounts to suffering. The author says:

"The last bi-monthly tea of the X. Y. Z. Club was the setting for one of life's little dramas. I was reluctant to leave my home that evening for the weather was severely cold. I braved the storm, however, and set out through the drifting snow and the cutting wind toward the shelter of the clubhouse. As I entered the reception room, whose color and warmth in contrast to the cold and darkness without made it unusually attractive, and saw the many groups of guests scattered about, a sense of well-being came over me. I settled myself in a comfortable nook to indulge in my favorite pastime, namely, to philosophize over the scene before me. That evening I learned a lesson in psychology in a new and forceful way. As each newcomer entered the room, he hesitated a moment at the threshold and looked about him. I observed that the first arrival, after this moment of hesitation, was at once appropriatead by a group which eagerly listened whenever he expressed an opinion. The next guest was welcomed into another group but not quite so spontaneously. The third one seemed a bit different from the average person and wandered about from group to group before he found his niche. Then a fourth came. He hesitated quite a long time at the door, then walked about the room wih his hands in his pockets. He looked wistfully at the gayety about him, but no one noticed him, nor extended a hand, nor gave him a friendly nod. Then other interests attracted me and I forgot him for awhile. When I remembered him a half hour later, I noticed that he had his hat and coat and was leaving, passing from the frigid, social atmosphere within to the cold and darkness without." In the social isolation of the fourth man we see the untrained spastic child today, tomorrow, and throughout his life.

Twice in my early experience I had recognized his type. I had seen him in the person of a pupil in a school I attended as a child. He was most repulsive in appearance. His gait was a drunken stagger and his speech was the bane of my life because he was an unsolvable by facial contortions. He was born of drunken parents and the current opinion was that he had been "marked." Naturally, the children avoided him. I know now that he was palsied or "spastic." Years later I became a second grade teacher and again I saw this "fourth man." Again he was in the person of a misfit boy. This boy was the bane of my life because he was an unsolvable problem that was ever before me. When the class marched, his feet were out of step and out of line; when it sang, his coarse monotone ruined the purity of the group tone; when it played ball, he crashed into the home base; in fact, there was no such thing as team work because his personality stuck out like a sore thumb. Nobody wanted him. He was shunted from room to room as the semesters rolled by. He was a drag in every class and an irritation to every teacher. Yet it never occurred to one of us to find out whether she irritated him. Had we done so, he might have paraphrased Shylock, saying, "Has not a 'spastic' hands, organs, dimensions, senses, affections, passions, fed by the same food, warmed and cooled by the same winter and summer, as a non-spastic is?" I never forgot these boys even though years passed before I met their type again. Then the contact came in a school for crippled children.

It is as a teacher in the Spalding School that the social discomfort of these particularly misfit children has been forced upon my attention. It has been forced upon my attention first, because of the prevalence of the type. At Spalding School, out of a membership of eight hundred fifty, one hundred fifteen are "spastic cases." One of the foremost surgeons of Baltimore, while holding clinics in Maryland, was amazed to find the following percentages of "spastics": 14%—10%—8%—12½%—23%—4%—19½%. Dr. Bronson Crothers of Boston says that he can select from any every-day-clinic group enough palsied cases to demonstrate for hours without making a special effort to bring them in. He thinks the number is larger than in the poliomyelitis group because the latter is usually epidemic while the former is continuous.

It has been forced upon my attention secondly, because of the great needs of the group. One of these needs is that of psychological research. Children whose lack of speech, facial contortions, and drooling would classify them as feeble-minded have an untrained native intelligence that cannot express itself. There are cases who, by the present standardized tests rate low, yet, who show unmistakable signs of good thinking ability. Dr. Arnold Gesell of Yale and Miss Elizabeth Lord, formerly of Yale, have standardized the reactions of normal infants at different month levels. It may be just to compare a month old palsied baby with a month old normal baby, but we wonder whether it is fair to measure an older, palsied child by the same measure that is used for a physically normal child of the same age. Their developmental opportunities certainly have not been equal. Dr. Gessell, in his book, *Infancy and Human Growth*, gives over an entire chapter to a plea for the better understanding of the cerebral palsied child. Dr. Abraham A. Low of the Illinois Research Hospital of Chicago is doing at present a fine piece of research among children. Only a careful, scientific study of each individual "spastic" child will make it possible to determine his physical and mental potentialities.

Another great need is a recognition of the urgency for adjusting the environment to the physical condition. The child with "lesion in the central nervous system" (after Lord, a term more inclusive than the term "spastic") is over stimulated by regular class room procedures because his inhibition is low. Competing with his classmates, both as to quantity and to quality of achievement,

irritates him. If he remains in the class room, he is in a continual state of tension; if he is excluded from school room environment, he is deprived not only of motor and academic training, but also, usually, of medical study. He goes out of the ill-adapted school situation into a bleaker outside world.

The third and fourth necessities are medical and vocational study. These unmet needs cause the social discomfort and the suffering of this "fourth man," and the resultant cry among all workers with the handicapped, "What shall we do with the 'spastic'?"

While Miss Jane A. Neil was principal of the Spalding School for Crippled Children in Chicago, she was constantly seeking the answer to this question. As she travelled about the country, she followed every lead that presented itself, one of which was a visit to Dr. Ivory Shepherd Franz, formerly of St. Elizabeth's Hospital, Washington, D. C., who gave her her first great inspiration to "carry on." When she returned, she opened to us visions of what might be done. After years of persistent and constructive building toward a plan, Miss Neil has developed a scheme which affords an opportunity at least to study this problem. The objective of the plan is to attempt to determine whether segregation and special technique in teaching methods will reduce the tension and the irritation that are incident to regular class room procedures. To that end a department was opened, known as "The Experimental Unit."

The personnel of the unit consists of fifty cases having intelligence quotients not lower than seventy, in so far as that can be determined. The selections were made on the basis of intelligence and motor handicap. The organization of the unit is as follows: There are two main divisions, the Home-Room Group and the Motor-Academic Group. The former reside in their own segregated class rooms, while the latter are scattered throughout the school from kindergarten through the high school. The Home-Room Group is subdivided into the Primary Room and the Nursery School. A third group, an Infant Clinic, will complete the unit.

Authorities in this field regard infant clinics as indispensable. Dr. Crothers says:

"It is indefensible to leave palsied babies without training until they reach school age. Their training is a matter of education rather than of medication. Parents need to understand that this education must be better than that of other children; that it must be begun in infancy and carried on in pre-school days; hat it is a matter of years as is all the rest of the child's education."

Miss Neil had long felt the need for the earliest possible training. Results obtained from education begun after the sixth year were not the best; mental and muscle habits were too strongly fixed; home attitudes toward the individual were too set to be easily changed. Her conception of the remedial work under existing conditions is to work down to the lower age levels as fast as circumstances and the ripening of public opinion will permit. It may be that some day preparatory training for the Nursery School in the form of an infant clinic will be, not a dream, but a reality, as it is already under consideration.

The Nursery School, opened in February, 1930, affords fine opportunities to the palsied child of ages two to four years. These age limits are flexible. The Board of Education provides the room, heated and lighted. The Sunbeam League and a patroness of the school provide the teacher and the splendid equipment we now have. The Nursery has its own playground and an activity room. A teacher, trained at National Kindergarten College, with nursery school technique as a background and an ever growing knowledge of the physical side, is in charge. The little ones, twelve in number, are transported by the school bus service. Rest and nutrition are carefully arranged for in each day's program. Speech training, muscle training, (including swimming), and regular nursery school curricula are given. The children enter having had little or no training in habits of sleep and rest, behavior, toilet needs, food reactions, etc. In the year's time they have learned to sleep and rest at regular intervals; tantrums, weeping, and enuresis have been practically cured; food is accepted as served. They are being taught to feed themselves, to swallow, to balance themselves, to walk, etc. The physiotherapist teaches them through games to use the large muscle co-ordinations. This group affords a wealth of material for research. We find that they enter the Primary room showing a higher level of physical and behavior adjustment than do those who have not had this training.

The Primary Group is made up of about twelve children of varying ages of the first, second, and third grade levels. They reside in the home room and are in charge of a regular teacher of primary academic subjects. They go to the occupational therapist for corrective handwork, to the physiotherapist for muscle training and swimming, and to the teacher of speech correction, if necessary. The curriculum is two-fold:

(a) Individualized. The tool subjects are taught, as far as possible, through individualized material. Thus each child progresses at his own rate, independent of the group.

(b) Socialized. This includes all the training that makes a child socially desirable. Games, music, rhythm, stories, and social situations are used to develop co-operation both physical and physic. Training in toilet habits, self-feeding, cleanliness, etc., create self respect. Correction of speech defects, though slow, develops a feeling of social security. At the end of each semester those cases who continue to need this intensive training are retained in the group but the rest are placed in the regular class rooms and become members of the Motor-academic Group.

Inasmuch as the grammar grade teachers find it difficult to determine just how to adjust the palsied students because there is no way to determine what they really know, the Motor-academic study is incorporated into the plan. The grade distribution is from the third grade through the high school. The basis of selection is serious disturbance of motor expression, either oral or written, or both. The children reside in the regular grade rooms and go to the unit teacher for help in academic subjects that require motor expression. In some cases a helper is employed by the hour to be "hands" for the individual. Thus far facilities permit this part of the plan to be carried out only meagerly. Another angle of the problem is to develop a sort of course of study that will be suited to these individuals and yet be so standardized as to be acceptable to educators.

The activities of the unit are three-fold: The academic, already partially alluded to, the physical and the social. The academic features have been discussed in the previous paragraphs, except as to expression. The type of expression to be used depends upon the purpose it is to accomplish. When a mental outlet is in view (for Spalding holds that, while the motor abilities must be developed to the last degree possible, nevertheless, such training should not be given at the expense of mental efficiency) then the least resisted pathway to expression must be sought. Typewriting is being experimented with as a medium for such an outlet. To that end some fourth, fifth, and sixth grade cases are being trained by a com-

petent teacher of commercial subjects to use the typewriter. The hope is that by the time the seventh and eighth grades are reached, these children will have obtained a sufficiently serviceable amount of skill to enable them to express themselves with a fair degree of ease. When therapeutic or vocational results are in view, then the school shops afford about fourteen different means of activity; namely, printing, manual training, brace repairing, basketry, pottery, weaving, novelty making, personal hygiene, sewing, cooking, dining room management, and child care (practice in which is received by assisting in the Nursery School and the Primary Room). In these shop activities the academic and the physical merge more or less.

Dr. Crothers in the following remarks to physiotherapists strikes the keynote in physical care. He says:

"The diagnosis of cerebral palsy, as far as physiotherapists are concerned, should be physiological rather than anatomic. They must train residual cells to make new patterns. First search for the assets. The functional disability is usually greater than the organic one. Encourage the child to use more activity than he is accustomed to use. Build up a morale and a sense of sufficiency." Our physical therapy program seeks to develop the residual cells through swimming, muscle training, occupational therapy, the use of appliances, when necessary, and speech correction.

The Nursery School children are taken into the water twice a week; the Primary Group are taught swimming three times a week; the Motor-academic Group, once a week. Special cases are given additional treatments as far as possible. The objectives in swimming developed in the order named, are: courage, breathing, walking, floating, swimming, and diving.

Children above the Nursery School age have occupational therapy every day. The physiotherapist makes the recommendations as to what movements are desired and the occupational therapist applies the exercise in terms of hand work. The work done is strictly curative.

In the Nursery School speech is very informal; in the Primary Room it is carried on largely through plays and games; but in the older group it is more precise. For all ages a certain amount of definite muscle training in the speech organs is indicated.

The use of appliances is limited largely to wheelchairs. The adjustment of wheelchairs and tables to patients is carefully watched. As rapidly as possible wheelchair cases are urged to sit at regular desks and to walk. Part of the technique is to analyze the physical steps that go to make the co-ordination desired; to teach the child what these steps are after having first made clear to him what it is that he is being asked to do.

Such a physical and academic program cannot function efficiently in the school unless it is vigorously supported by the home. Therefore a program of social activities must be carried on concurrently. It includes parent education and vocational guidance. A visiting nurse or teacher is the link (at present a missing link) between the school on the one hand and the home and economic world on the other. Parents need education in regard to the child's emotional needs, to the right attitude toward behavior problems, to a proper health program, to his treatments, to operative work, to the use of appliances, to his training, and to planning his future.

Vocational guidance, training, and placement are the crux of the whole matter. To accomplish these steps we endeavor: to link psychological testing with all training; to link the child's aptitudes with industries and professions; to link the school with industries and professions; and to educate the public to employ the paralyzed. In the effort to direct the child, conferences have been held in which have sat the parents, the psychologist, the physiotherapist, the occupational therapist, the teacher of speech correction, the grade teacher, the shop and art teachers, the vocational guidance worker, the principal, and, where possible, the superintendent of special schools. The object of the conferences has been to get the composite of the individual's assets through the slants contributed by each worker who has contact with him. By ruling out his liabilities an attempt is made to map out his future. Some of the recommendations of these conferences have been as follows: home-keeping, child care, training for certain kinds of factory work, and a course of training that will lead into Scout work. How practical these recommendations are remains to be seen.

The whole matter may be epitomized:

In our creed: That all previous care, cure and education find their consummation in final placement of the palsied in their own homes, in industry, or in the professions.

In our hope: For the co-operation of education, medicine, and industry; for the time when these palsied will

For the time when these palsied will not be like the fourth man at the tea, but will have been trained and helped until they have become integrated into some niche suited to their abilities.

In our aim: To give to every child with lesion in the central nervous system

"1. The best physical condition it is possible for him to attain.

"2. The best education he can assimilate.

"3. To help him find his place for service in the world's work."

Recreation for the Physically Handicapped*

By Verne Marie Miller

INTRODUCTION

The happy child is a healthy child. The happy convalescent regains his health faster than the restless unhappy child, unhappy because he does not have enough to do to keep him occupied. The object of this paper is to show how entertainment may be provided to keep all types of handicapped individuals happy and busy.

A rather thorough search for material suited to the physically handicapped proves that there is very little to be had. What is available is appropriate for only the more active individuals, those who can get about. Nothing can be found for bed, wheel-chair, or frame patients. Swimming of course is a most valuable activity and can be used with almost any type of patients provided they are not in body casts. It, however, is out of the field and is adequately covered by other papers. Reading the reports of such institutions as the Junior League Curative Workshop in Milwaukee, the Industrial School for Crippled and Deformed Children in Boston, and the Burke Foundation in White Plains, New York, shows that the biggest problem is the handling of spastic and severe infantile paralysis cases.

All three of the above named institutions report the use of adapted common sports to the handicapped groups. The Junior Curative League has worked out an interesting and effective use of the dance, in which for example, the child interprets a butterfly in its driftings. In order to do so he must spread his wings, thus raising his arms which means active using of the deltoid muscles. Deltoid cases being the ones to whom this activity is given get direct treatment of which they are not conscious because they get it through play.[1] Spalding School in Chicago has worked out uses of rhythm such as poems with accompanying actions for its spastic cases. However, all these reports on the work done are very general, in fact so much so that the reader almost invariably wonders exactly *what* and exactly *how* it was done. Of course it must be remembered that as each case is the only one of its kind, there must always be a slight variation in the work in order to make it fit every individual.

METHOD OF PROCEDURE

Combining the ideas gained from reading these various reports with those already acquired from dealing with the various types of patients, the experimenter adapted some and originated other material which was considered to be suitable, entertaining and of therapeutic value. This material was then tried out. Some of it was used in the Wisconsin General Hospital Annex at Madison. There were about twenty-six patients here, their ages ranging from 2 to 24. About half of them were bed patients, some wearing body casts, leg or arm casts and two were on frames. The types of cases included were spastic, infantile, and obstetrical paralysis, tuberculosis of the spine, osteomyelitis, and spina bifida. The rest of the material was tried out at the Doty School for Crippled Children in Madison with a group of nineteen ambulatory cases, boys and girls ranging from 7 to 18 years of age. Among these cases were spastic and infantile paralysis, hydrocephalus, fractures, congenital dislocations, arthritis. Of this material only that which has proved successful in gaining wholesome, spontaneous response, is included in this paper in the hope that it may prove useful to persons dealing with handicapped children.

MATERIAL

"The first requirements for a person dealing with the physically handicapped is the possession of a fund of originality. She must not only be able to adapt material to the demands of the various handicapped patients, but after she has accomplished this she must be able to change it, maybe only slightly for each individual case. The first part of the paper shows the general requirements for activities of the physically handicapped, and how these activities have been adapted from these commonly used. Following this are the specific activities as they were used."

CONDENSED OUTLINE

Balloons — Given in Detail
- For patients on frames.
- For foot patients and leg patients.

Bells — Given in Detail
- Children in bed.
- Foot and leg cases.

Balls — Given in Detail
- Children in bed.
- More active children.

Then follows in detail games for:

Arm Activity

Breathing Activity

Finger Activity

Games and Events for more active individuals.

Material based on game played by children in Crippled School in Madison.

Foot Work

Rhythmic Activities

(Including about twelve activities with some music.)

Play Activities

1. Simon Says
2. Bird, Beast, Fish
3. Ring the Stick
4. Ball Board
5. Shoot a Basket
6. Indian Club Bowling Relay
7. Find the Hole
8. Quoits

Finger Activities

9. Finger Bowling
10. Indian Plum Stone Game
11. Snap Discs
12. Seclot (Phillipine game)
13. Clothespin Croquet
14. Pig Pen

Track Meet Events

1. Potato Race

*This abstract is from a thesis in the Department of Physical Education at the University of Wisconsin. Any reader interested in a complete reprint is urged to get in touch with that department.

[1]Junior Curative League Workshop. Report of 1929.

2. Accuracy Throw
3. Distance Kick
4. Distance Backward Throw
5. Bean Bag—Bowling Between Indian Clubs
6. Relay Race

Foot Activities

1. Race
2. Target Throw
3. Tit-Tat-Toe
4. Foot Base-ball

Finger and Rhythmic Activities

1. Grandma's
2. The Pigs
3. All for Baby
4. Ten Little Indians
5. One-Two-Three
6. Jack Be Nimble
7. Bummel Schottesche
8. The Roman Soldiers
9. I Love Little Pussy
10. Trot, Trot, Trot
11. Sing a Song of Sixpence

The above includes some music and descriptions.
Then follows: Summary.

SUMMARY

"If a child enjoys what he is doing his efforts become supreme. Give him an exercise to do, and he does it half-heartedly, getting only part of what he should from it. Give him a game using the same parts and he plays as if his life depended on it, getting the maximum of results. If the business of re-educating muscles depends so much on the exercise of the muscles, the question is how can the best results be obtained? The adding of the element of interest is a saving factor. Give the youngster a game and he will be happy. You will probably find him playing the game of his own accord thus getting extra treatment.

"In using the element of interest which really resolves itself into plays and games, there are some things which will prove helpful to one trying this plan. Everyone knows these things which may be called rules, such as never allowing the patient to overwork the part, and the need of beginning with large slow movements and working down to the finer faster ones. There may be however a few things which everyone does not know. Working with children in all types of groups has proved that there is absolutely no necessity for music to give rhythm when there is any kind of a verse or jingle for the child to say. In fact the child usually follows a sing-songy nursery rhyme much better than music, since the accompaniment of the melody confuses him.

"Children will play a long time at activities which to us seem to have little or no point. They evidently enjoy the activity for itself. It is not necessary for their materials to be of the best; they enjoy the rude finger dollies they make better than fancy paper ones all fixed up to be finger dollies. With the older groups the activities given as contests most often bring the best results. The handicapped children can usually do more than is generally supposed; and those above the baby stage have enough common sense to know what things they should try and from what things to stay away. In this respect they are much superior to the normal child who would walk the edge of a skyscraper if he got the chance.

"In spite of the irregularity in which the children were visited, definite results were noticed."

(Then follow descriptions of experiences in the hospital.)

"With children who have been invalids all their lives and whose parents have waited on them hand and foot, there is quite apt to be a great deal of wrangling, a result of their selfishness. This attitude is especially outstanding in the poor sportmanship shown during games."

(Improvement in sportsmanship noted in public school group.)

"In this day and age mental health and its effect on physical health are stressed more and more. Should not activities which improve the mental health of the patients be quite important in a hospital regime whose aim is to improve the physical health of its patients?"

Nerve Injuries*

By F. Crooks, M.Ch., F.R.C.S., Eng. (President of the Nottingham Branch, C. S. M. M. G.)

Let me first remind you that when you are treating nerve lesions you must always think in terms of muscle and not of nerve. There are a few circumstances when you have to really consider the nerve; for example, after a nerve suture the joint may have to be kept flexed to prevent any stretching of the nerve until it has united. I will deal briefly with the commonest injuries to nerves, and with the question of their surgical treatment, before going on to the principles of the treatment with which you are concerned.

The nature of the injuries in which nerve lesions are likely to occur are (1) Open wounds; (2) Pressure; (3) Traction. Open wounds may be either accidental or operative. Accidental wounds of the median and ulnar nerve in the forearm are the commonest. They are usually due to stab wounds or cuts by sharp instruments or broken glass. In operations, injuries to the facial, the musculospiral, and the spinal accessory nerves are the most frequent.

Pressure may be sudden or prolonged; the musculospiral, the brachial plexus, and the external popliteal nerves are most frequently affected by pressure. A late paralysis may arise from scar contracting on the nerve, or from excess of callus pressing on it. Tumours or any form of new growth may cause a pressure paralysis.

As the result of traction, the brachial plexus, the circumflex, and the great sciatic are the nerves which usually suffer damage. We may get a late paralysis of the ulnar nerve after a supracondylar fracture of the lower end of the humerus; this results from a stretching of the nerve over the internal condyle.

Nerve injuries associated with fractures may be due to the violence which causes the fracture, or to the ends of the bones lacerating the nerves, or to excess of callus surrounding or pressing on the nerve. The musculospiral is the one which is most commonly injured in association with a fracture.

In nerve lesions complicating dislocations, the injuries may be due to original violence, or to pressure of the head of the bone, or may be produced in attempts at reducing the dislocation.

During an operation a nerve may be injured by cutting or crushing it accidentally. The application of too tight a bandage or tourniquet, or a tourniquet applied for a very long period, or manipulation during an operation may result in paralysis, for example, owing to the arm or leg being allowed to hang over the edge of a table.

THE NATURE OF THE DAMAGE DONE TO A NERVE

First there may be a complete rupture of the nerve. Secondly, the rupture may be incomplete, that is, only some of the fibres are divided or torn. Thirdly, the nerve may be contused or stretched. This usually results in small hemorrhages into the nerve. There is no actual damage done to the nerve fibres, but there is a block to the passage of nerve impulses. Pressure on a nerve may give rise to a physiological blocking of the nerve without there being any actual damage done to the nerve. The resulting paralysis is only temporary.

Symptoms of the complete division of a mixed nerve may be considered under three heads, namely, sensory, motor, and trophic.

(1) Sensory changes. There is, first, loss of sensibility to light touch; secondly, loss of sensibility to pain; and thirdly, loss of deep sensibility, or, as it is often called, joint sense. An injury to a purely motor nerve will not give rise to any sensory changes; for example, injury to the lower end of the musculo-spiral after the sensory branches have come off will not give rise to sensory changes.

(2) Motor symptoms. Paralysis of the muscles supplied by the nerve. The muscles cease to respond as a rule to a faradic current in five or six days, and they give a sluggish response to interrupted galvanism; after ten or twelve days they may give reaction of degeneration. Reaction of degeneration, we used to be taught, was always an absolute sign of a complete division of the nerves. Now we do not lay nearly so much stress on the presence or absence of it. The question of the nature of response to galvanism is much more important. The muscles become flabby and wasted.

(3) Trophic changes. The skin stops desquamating; it becomes dry, glossy, and cold; the nails lose their gloss and become rough and thick. These are the symptoms of a complete nerve lesion.

SYMPTOMS OF INCOMPLETE NERVE LESION

(1) The sensory changes may vary from a slight loss or alteration in the sensibility to complete loss of sensibility, and pain is often a characteristic of an incomplete division of a nerve.

(2) Motor paralysis; the muscles as a rule respond to a faradic current and they also respond to an interrupted galvanic current, and R. D. is absent. You must think, or remember, rather, that in an incomplete division of the nerve you may have some of the nerve fibres divided—that is, fibres going to one or two muscles may be divided, whereas the fibres going to the remainder of the muscles may not be divided. The symptoms naturally vary according to the extent of the injury and they may not appear for a few days. These incomplete divisions of nerves, or any injury that does not result in the severance of the fibres, are very liable to give rise to neuritis afterwards.

I will just mention briefly the chief points of importance in the surgical treatment of nerve injuries. In the case of a complete division, generally speaking, an operation should be performed as early as possible. If a fracture is present it should be dealt with at the same time. In incomplete division, treatment should be carried out on principles laid down later, but if improvement does not take place the nerves should be explored. In secondary nerve lesion, that is, due to pressure by callus or scar tissue, treatment should be carried out for a time, and if signs of recovery are not evident in a reasonable time, the nerve should be operated upon.

Now I will give you a few points about the recovery

*From the Journal of the Chartered Society of Massage and Medical Gymnastics (Great Britain).

of a nerve lesion. The rate of recovery, other things being equal, varies considerably in different nerves; for example, recovery always takes place much more quickly in the case of the musculo-spiral nerve than it does in the great sciatic. Sensibility to pain appears in two or three months and is complete in six to twelve months. Light touch sensation appears after six to eight weeks and is seldom complete before twelve to eighteen months. The power of localization may not be complete for two years. As regards active motor power the time varies very considerably and depends to a great extent, other things being equal, on the treatment being carried out on the right principles. These points apply after a primary suture of the nerve. After secondary suture of the nerve recovery is much more doubtful. After an incomplete lesion the recovery depends to a large extent on the damage done to the nerve, and, of course, on the lines of treatment.

These are the chief points I want to say about the surgical treatment of nerves before I go on to the points with which you are chiefly concerned. In the first place you cannot understand the principles which are to guide you in the treatment of nerve lesion without having a sound knowledge of the action of the muscles. I will try to state clearly and as briefly as possible the most important points about muscles.

Mechanically a muscle produces movement by acting on a bone as a lever. Each muscle has a constant nerve supply. Generally speaking a muscle arises from one bone and is attached to another. In response to nerve stimulus a muscle can contract or relax. Each muscle has a definite action and it acts in conjunction with an opponent which causes the opposite movement; that is, as a muscle receives a stimulus to contract its opponent also receives a stimulus to cause complete relaxation. A muscle is composed of cells which are arranged to form fibres; as a result of the stimulation received through its nerve the fibres contract or relax, and so cause shortening or permit elongation. The shortening causes movement and elongation permits movement. Muscle fibres never regenerate as such and once they have been destroyed they are replaced by scar tissue. If a paralyzed muscle is allowed to be stretched, either by gravity or by contraction of its opponent, permanent damage is likely to be done to the muscle fibres. The fibres become permanently elongated and they cannot contract fully again; the fibres of the healthy opponent become permanently contracted, and so cannot elongate in order to permit the recovering muscle to contract. Contraction and relaxation of the muscles are physiological actions. Elongation can only take place in a relaxed muscle and is due to an outside cause; viz., the contraction of the opposing healthy muscle or the action of gravity.

The first point in the treatment of a nerve injury is that the limb should be fixed so that the paralyzed muscles are fully relaxed and the healthy opponents prevented from contracting. There should be no strain on the paralyzed muscles or groups of muscles.

I will deal with the broad principles which are to be your guide in the treatment of nerve injury. The object of your treatment is to preserve the nutrition of the muscles, and to teach the paralyzed muscles to contract again. The latter point is one that I am afraid some of us are inclined to overlook, but it is one of the most important points in the treatment of a nerve injury, that is, re-education. First, the limbs should be kept warm. This is another most important point we are inclined to overlook; woollen garments or cotton wool should be used to retain the heat in the limb. The muscle should be massaged daily, if possible. The muscles should be stimulated by an electric current, but here you must take care not to fatigue the muscles by a prolonged stimulation. All the joints should be gently put through their full range of movements once at each treatment. This is a most important point which is often overlooked. What is the object of getting voluntary power in your paralyzed muscle, if the joint which it has to move when it has recovered is allowed to become stiff? The reason these joints are liable to become stiff is this: in the accident the joints themselves may have been damaged, and a damaged joint is much more liable to become stiff than a healthy one.

As I have said before the re-education is the most important point of the treatment. First, you must get the confidence of your patient; you must explain clearly to him what you want him to do, and you ought to make him practise doing the movement which you want him to do in the other limb. You must always consider gravity and friction, and you must try to eliminate these as obstacles to the contraction of the muscle, and if possible, you must make use of gravity to aid the voluntary movement.

At first you must ask a paralyzed muscle to do the very minimum amount of work possible, and as voluntary movement returns you must try to increase gradually the amount of work until it can do the full amount of work which that muscle does normally. You must do this very carefully. You must not fatigue a recovering muscle. This is a point I cannot emphasize too much. There is too great a tendency for us all—and here I am afraid I include members of the medical profession as well as of your own Society—to expect a muscle to do its maximum amount of work after we find the patient has gained some voluntary movement. As regards reactions, generally speaking voluntary movement is fairly strong and may have completely recovered before the muscle can respond to a faradic current. In the case of a mixed nerve lesion you must always warn your patient against burning or scalding the anaesthetic part of the limb, and you must take great care in using any form of heat as part of your treatment.

I would like to deal briefly with the treatment of the most common individual nerve lesions, and in doing so I wish to lay special emphasis on the position in which the part must be splinted in order to obtain relaxation of the affected muscles.

Let us take facial paralysis first. The facial nerve is liable to be injured in operations on the ear, and on the parotid gland. It may be due to tearing of the nerve in injury or fracture of the base of the skull. You should always use a wire splint to relax the muscles. This is a very important point and one that is sometimes overlooked, because in facial paralysis over-contraction of the healthy side occurs very rapidly. If a splint is not used I think you are likely to get over-contraction more quickly than in any other form of paralysis.

As regards paralysis of the brachial plexus, we meet this lesion in obstetrical paralysis, that is, injuries to the brachial plexus during labor. This injury is usually produced by forcible rotation of the head and neck, and also by traction on the shoulder. In adult life direct blows on the plexus, wrenching of the arm or twisting of the head and neck are the common causes. The prognosis depends on the extent of the damage and should always be very guarded. In a complete lesion of the brachial plexus the position is as follows: The arm should be held at right angles at the shoulder, should be externally rotated, the forearm supinated, the elbow flexed to a right angle, and the wrist extended. The important point is that you must get external rotation. Generally speaking, in adults, if there is a sign of a complete lesion of the

whole or any part of the plexus, it is better to operate at an early date.

Now let us take the circumflex. This supplies the deltoid and is commonly injured in dislocation of the shoulder joint. The muscle should be relaxed with the arm adducted to a right angle and externally rotated. It is important to get the arm out at right angles in line with the two shoulders, and not brought forward, otherwise you are liable to get contraction of the pectoral muscles.

The musculo-cutaneous supplies the biceps and the brachialis anticus, the biceps supinates the forearm and the brachialis anticus produces flexion at the elbow joint. As the biceps is attached above the shoulder joint as well as to the humerus the shoulder joint ought to be fixed in an adduction splint, the elbow bent to a right angle, and the forearm supinated. I might here mention that you are liable to forget that the chief function of the biceps is supination of the forearm.

If the musculo-spiral is injured high up the triceps is likely to be involved also, but if the injury is low down only the extensors of the wrist joint and of the proximal phalanges of the fingers are paralyzed. If the triceps is involved the elbow must be extended. If this is not involved it is sufficient to put the wrist up in extension with the fingers extended; the thumb must be fully extended and adducted in this position, because you must remember that the chief abductor of the thumb is the extensor ossis metacarpo-pollicis. A long cock-up splint with a thumb-piece is the most convenient splint.

In lesion of the ulnar nerve the fingers should be placed at right angles at the metacarpo phalangeal joints, the object being to relax the lumbricals which cause flexion of the proximal phalanges and to relax the interossei which produce extension of the distal phalanges. The thumb should be strapped across the palm to rest the abductor, and the wrist must be flexed to rest the flexor carpi ulnaris. If the lesion involves the muscles of the forearm, the elbow should be bent at a right angle because the muscles are attached to the lower end of the humerus. If the lesion is lower down in the forearm it does not matter about the position of the elbow, except that it is better to keep the arm in a sling.

The median nerve: here again it may be injured high up, and the muscles of the forearm involved, or lower down and only the intrinsic muscles of the hand involved. The median nerve supplies the pronator so the forearm must be pronated, the elbow flexed at right angles, the wrist flexed to rest the flexor carpi radialis, the thumb flexed at all its joints, and drawn across the palm to relax the opponents—it should be fixed across the palm of the hand by strapping—and the fingers should be semi-flexed to rest the long flexors.

Having given you the position of all the common injuries of the upper limb, I will proceed to the lower limb. Injury to the nerve supply of the muscles which produce movement at the hip joint is usually due to fracture of the pelvis or lumbar spine, in which case it is usually associated with paralysis of the whole limb; but before I leave this I would like to point out that one of the most important muscles concerned with the movement of the hip joint is gluteus maximus. This is the muscle which enables us to stand erect, and a paralysis of this muscle is a serious handicap. The anterior crural nerve may be injured in fracture of the pelvis and of the upper end of the femur. It results in paralysis of the quadriceps; the function of this muscle or group of muscles is to extend the knee joint, so this joint must be kept extended in a Thomas's splint.

The great sciatic, if injured high up, results in paralysis of the hamstrings and of the muscles of the leg below the knee joint. Generally speaking, injury to the great sciatic is low down and often involves only the external or internal popliteal divisions.

I would like to give you an account of the muscles which act on the ankle and tarsal joints, because I am afraid there exists in most of our minds some confusion as to the action which the different muscles produce at the ankle and foot. Flexion of the ankle is produced by the tibialis anticus, peroneus brevis, and peroneus tertius; extension of the ankle joint is produced by the gastrocnemius, peroneus longus, and tibialis posticus. Inversion of the foot with the foot dorsi-flexed is produced by the tibialis anticus. Inversion with the foot extended is produced by the tibialis posticus. Eversion with the foot dorsi-flexed is produced by the peroneus tertius and peroneus brevis. Eversion with the foot extended is produced by the peroneus longus.

In an injury to the external popliteal nerve the peroneal and the anterior tibial groups are paralyzed. This results in loss of eversion, of dorsi-flexion, of inversion with the foot in the position of dorsi-flexion and of extension of the toe joints. In an injury to the external popliteal the position of rest is with the knee joint extended (and this is most important because of the origin of some of the leg muscles from the femur), the foot at a right angle and the toes extended. Early voluntary movement should be encouraged with the patient lying face downwards and a large pillow beneath the lower part of the leg, or you can have the patient lying so that the foot hangs over the end of the couch. This is the easiest way in which you can overcome the effect of gravity on the foot, because in this position the foot will naturally keep at a right angle.

In the case of injury to the internal popliteal nerve there is loss of extension of the ankle, of inversion of the foot in extension, and of flexion of the toes. In this lesion the knee should be slightly flexed, the ankle extended very slightly and the toes flexed.

In conclusion I will recapitulate the most important features that you must never forget in the treatment of the muscles in a nerve injury; i. e. that the muscles must always be relaxed, and the opposing muscle always kept from becoming contracted; that in a recovering muscle the amount of work it is asked to do should be the very minimum at first and should be increased very gradually, until the muscle is able to do the full amount of work it is normally expected to do. You cannot rush the recovery of a muscle, and if you try to do so you will delay the progress of recovery. The interrupted galvanic current is the best form in which electricity should be used; but, finally, let me impress upon you again that electrical treatment takes second place to re-education.

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Abstracts

By John S. Coulter, M.D., Assistant Professor of Physical Therapy, Northwestern School of Medicine

The Practical Consideration of Chronic Arthritis. William C. Chaney, M.D., M.S., F.A.C.P., Memphis, Tenn., in Internat'l J. Med. & Surg., 43:12:640, December, 1930

Drugs.—Arsenic and the salicylates are still of value in the treatment of arthritis.

Vaccines and Foreign Proteins.—Specific or autogenous vaccines are now very rarely used. Foreign proteins are worth trying in certain cases that are resistive to other treatment. Typhoid vaccine, given intravenously, is now the foreign protein of choice.

Rest.—It has been shown that either physical or mental strain lowers the threshold to nervous stimuli and causes fatigue of parts of the autonomic system. Pemberton says that many cases of arthritis originate in fatigue. Frequent periods of real physiologic rest, therefore, are highly important in the treatment of arthritis.

Resection of sympathetic ganglia and trunks.—Rountree, Hench and Adson have now reported eighteen cases of severe arthritis in which brilliant results have been obtained by what seems to be a rather radical surgical procedure. It must be remembered, however, that most of the patients selected for this form of treatment were practically bedridden.

Diet.—Generally speaking, the patient should be put on a high vitamin, anti-constipation diet, paying particular attention to vitamin B but Pemberton's suggestion that some of these patients are over-fed is undoubtedly true. He suggests that the proportion of carbohydrates be decreased and the fats relatively increased.

Physiotherapy.—While physiotherapy is being considered last among the various forms of treatment of arthritis, its value is very great. Most internists have been backward in recognizing the great importance of this form of treatment. Physiotherapy in arthritis should include massage of the joints, active and passive movement, the daily application by the patient of some form of heat to each involved joint and frequent treatment by diathermy. The recent developments in the study of the sympathetic nervous system has suggested the use of diathermy applied over the region of the cervico-thoracic and lumbar ganglia rather than to the joints. It has been shown that this form of heat used in this manner gives far greater relief to the affected joints than when applied directly to them. It is of great interest to note that after the use of diathermy, the cold, clammy, sweaty hands become dry and warm.

Again it is necessary to emphasize the fact that chronic arthritis is really a constitutional disease. Every case of arthritis that presents itself to the physician must be studied as an independent problem and all the resources at the command of the thinking physician must oftentimes be called upon if desirable results are to be obtained. His problem may carry him into the field of allergy or into the domain of endocrinology and in fact into almost any of the specialties. As Pemberton has said, "Arthritis touches more fields of medicine than does any other pathologic state."

Common Colds and Nasal Catarrh. W. J. Harrison, M.B., B.S., M.R.C.S., Surgeon to the Ear, Nose and Throat Hospital, Newcastle-on-Tyne, Surgeon in Charge Ear,, Nose and Throat Department, Fleming Memorial Hospital for Sick Children, Newcastle-on-Tyne, in the Practitioner (London), cxxvi:1:75, January, 1931.

TREATMENT

This is indicated by the cause. Clothing should be sufficient for what is going to be done, but many people, particularly those who lead a sedentary life, are so heavily clothed, even indoors, that healthy action of the skin is interfered with and metabolism lowered.

When there is a large quantity of discharge in the nose, it should first be washed away with nasal washes used at body temperature. A coarse spray should be used for children.

Many methods are advocated for aborting a cold. *Ultraviolet rays* have been very largely used, both generally and locally, for acute and chronic catarrh. There is no doubt that the general tonic effect is beneficial in increasing the general resistance, as is local treatment if properly used in suitable cases, but the blind fold way in which the treatment has often been used without any attention to general and local conditions, is to be deprecated, and unskilled local use may do more harm than good.

Vaccine therapy.—Again, unless local and general conditions are dealt with, when they exist, the use of vaccines will prove disappointing as the predisposing conditions remain untouched. As previously mentioned, certain people are very susceptible to infection though nothing can be done to account for this, and such persons are constantly infecting others. Inoculation may prove of considerable value in such cases. A polyvalent vaccine would appear to be more suitable in such cases than an autogenous vaccine, as the condition may be produced on one occasion by one or more organisms and by different organisms in the next attack. Should the stock vaccine not be successful an autogenous one should be prepared.

Additional Light on the Dysmenorrhea Problem. Norman F. Miller, M.D., Prof. of Obstetrics and Gynecology, State University of Iowa College of Medicine, Iowa City, in Jour. A.M.A., 95:24:1796, Dec. 13, 1930.

On the whole, medical treatment of menstrual pain has been unsatisfactory. Temporary improvement is readily accomplished, but desirable permanent relief seldom rewards even the most diligent efforts along this line. From time to time those interested in physical education for women have reported apparent benefit associated with simultaneous improvement in posture. As a group, physicians have paid little attention to these reports, thinking possibly that it is simply another method of dodging the question.

Failing to achieve satisfactory results with available methods, and stimulated by the optimistic reports of

those interested in the teaching of physical education in our universities and colleges, we determined to learn, if possible, the relationship existing between faulty body machanics and common gynecologic complaints, especially dysmenorrhea. Using the girls of the entering classes at Wellesley College, the University of Iowa, and the Nurses Training School at the University of Iowa as subjects, we commenced the study in the fall of 1927. In all, 785 young women were available for study.

Posture and muscle tone ratings were determined from study of the nude individual and shadow pictures, by more than one trained person well qualified in the work of objective grouping on a posture basis.

Since the beginning of the study in 1927, check up examinations have been made in 1928, 1929 and 1930 by an examining staff which with a few exceptions has remained intact since the beginning of the study.

Throughout this work we have been conscious of certain definite objections to the method of study employed. The complete reliance on objective observation, and the noticeable lack of methods of precision form the principal drawbacks. Muscle tone is probably more fundamental than posture, but adequate definition and methods of measuring are conspicuous by their absence.

Lack of careful pelvic examination is another objection that has been eliminated in new studies recently commenced. Since most of the individuals in the present group are generally healthy young women, we have assumed the pelvic organs to be relatively normal.

Diet, climate, environment and glands of internal secretion may be mentioned as other factors deserving consideration.

Results of Study

Completely relieved cases.—Of the 495 subjects with complete records for the years covered in this study, 237 had dysmenorrhea in some form at the time of the original examination in 1927, and of these 127 were completely relieved by 1929. Forty-eight, or 38 per cent of this number originally had severe pain as indicated by the necessity for limited activity or rest in bed at the period time. The remaining seventy-two, or 62 per cent, had a mild type of dysmenorrhea.

Greatly relieved cases.—Twenty-nine of the 237 dysmenorrhea cases were greatly improved at the end of the period under consideration, twenty-one, or 72 per cent, being severe and eight, or 28 per cent, mild in character.

Unimproved cases.—Of the 237 cases of dysmenorrhea in 1927, 81, or 34 per cent failed to show any improvement.

Cases without dysmenorrhea.—Two hundred and fifteen individuals had no dysmenorrhea in the fall of 1927 or in 1929.

Relationship Between Faulty Body Mechanics and Dysmenorrhea

While it cannot be said that faulty posture or poor muscle tone causes dysmenorrhea, our study reveals a decrease in the occurrence of dysmenorrhea coincident with improvement in pocture and muscle tone. This improvement occurred during a time when the method of living could scarcely be considered conducive to restfulness and quiet.

It is conceded that the tone of the skeletal muscles serves as a good index to the tone of the circulatory system, and consequently individuals with poor skeletal muscle tone may be said to have poor tone of their circulatory systems. The significance of this becomes evident when it is recalled that the pelvic organs are abundantly supplied with blood vessels, the veins forming an extensive interlacing network through anastomoses between the pampiniform, uterine, cervical, vaginal, bladder and hermorrhoidal plexuses. These veins are characteristically thin walled, and except for those of the uterus receive their chief external support from intra-abdominal pressure. They are also distinctive in that they and the large veins into which they empty do not have valves as do the veins of the legs. Roughly, the total blood volume of the body may be divided into quarters, one quarter being in the peripheral circulation, one quarter in the heart and lungs, and the remaining half in the portal circulation and other abdominal organs. In the quadruped most of the blood volume is near the heart-level and consequently no excessive strain is placed on the vascular system. In the biped, or human being, however, most of the blood is below the heart-level and the circulatory system is subjected to considerable strain. So long as the muscular tone of the body is good, no untoward effects are noticed; but with the loss of tone, distressing symptoms may arise. Because of their location in the most dependent portion of the peritoneal cavity and because of the presence of numerous interlacing thin walled valveless veins, the generative organs are particularly susceptible to conditions causing congestion.

The psysiologic changes occurring at the time of the normal menstrual period must also be considered. The first or premenstrual stage lasts from seven to ten days and is characterized chiefly by congestion of the pelvic organs. When the hyperemia of the uterine mucosa reaches the breaking point, hemorrhage occurs into the surrounding tissues by rhexis and diapedesis. This inaugurates the second or desquamative stage, characterized by the loss of the surface epithelium from the uterine cavity and the onset of the menstrual flow. Normally this stage is thought to last about two days, following which the third or regenerative stage begins, when regeneration or rebuilding of the endometrial glands takes place and is generally complete in four days.

If lack of muscle tone plays a part in causing dysmenorrhea, one might justly expect the discomfort to begin before or with the onset of the menstrual flow and to cease as soon as the congestion subsides or the pelvic organs are depleted. In the majority of cases this is exactly what happens.

Summary

It may be well to repeat that while it is not justifiable to conclude that faulty posture and poor muscle tone cause dysmenorrhea, a reduction in menstrual pain has occurred along with a decrease in imperfect posture and poor muscle tone as a result of directed physical exercise. In the face of these observations, it would seem that the reduction in dysmenorrhea associated with improvement in body mechanics is more than mere coincidence.

Treatment of Fractures of the Head and Neck of the Radius. J. Albert Key, M.D., in Jour. A.M.A., 96:2: 101, Jan. 10, 1931.

Fractures that should be treated conservatively.—The first group includes: (1) fissure fractures of the head; (2) chip or chisel fractures of the head in which the detached fragment comprises less than one third the circumference of the head and is not displaced or does not lie against the ulna, and (3) fractures of the neck in which there is practically no displacement of the upper fragment. In these, all that is necessary is to immobilize the elbow and forearm in a position of moderately acute flexion for from two to four weeks. This is conveniently and efficiently done by a posterior plaster mold reaching from the upper arm to the base of the fingers and suspended by a clove hitch or cravat sling.

When the mold is removed, the wrist is suspended from the neck by a Jones sling and active motion is begun. The sling should be lengthened gradually, but the patient should fully flex the elbow several times daily. If he begins to lose flexion the sling should be shortened for a few days. Definite exercises in rotation should be prescribed as soon as the mold is removed. Normal motion may be expected in from six to eight weeks after the accident.

Other than the graded exercises, no physical therapy is necessary or indicated. Forcible manipulations are to be avoided.

Fractures that should be treated by operation.—The second group includes (1) comminuted fractures of the head; (2) chip or chisel fractures of the head in which a fragment larger than a third of the head is detached and displaced or in which a small fragment next to the ulna is displaced, and (3) fractures of the neck in which the head is displaced downward or so tilted that its rounded border can no longer rotate in the sigmoid of the ulna and in which the displacement cannot be reduced by manipulation (and this means practically all of them).

Fractures that should be treated expectantly.—The third group includes all doubtful cases of group 1; that is, cases with chip fractures or fractures of the neck with slight displacement, in which the surgeon feels that conservative treatment may yield a satisfactory elbow, chip fractures with considerable displacement of the detached fragment which may be loose in the joint, and fractures of the neck with complete and extensive displacement of the head, which usually lies embedded in the tissues beneath the flexor muscles of the forearm and can no longer block motion at the elbow.

In all of these, conservative treatment may be given a fair trial; but the patient should be told that it may be necessary to operate on the elbow at a later date and remove a small piece of bone that is blocking motion.

Treatment of Intermittent Claudication with Hyperpyrexia Produced by Baths. H. G. Mehrtens, M.D., and P. S. Pouppirt, M.D., San Francisco, in Jour. A. M. A., 95:25:1910, Dec. 20, 1930.

Technic of the bath.—An ordinary bathtub and bath thermometer may be used, although the continuous tub admits of a more satisfactory control of fever. An ordinary mouth thermometer will suffice at lower temperatures, but a rectal thermocouple is very helpful at high temperatures or for noncooperative patients. For this type of patient a mouth temperature of from 103 to 105 F., is sufficient.

Our technic consisted in immersing the patient in a bath at 110 F. With timid patients, or on the occasion of the first bath, the temperature can be started at 105 F. Ordinarily 110 F. was maintained until the temperature of the patient reached a point within 1½ degrees of the fever desired. Then the temperature of the water was reduced until it corresponded with the mouth temperature of the patient. The routine bath lasts one hour, but when indicated it is feasible to maintain the patient's temperature by wrapping him in blankets. A daily bath repeated fourteen times is indicated for most patients, although twice this number were given consecutively with no added difficulty.

Clinical Results.—In the great majority of the less severe cases, symptoms were ameliorated by a series of fourteen baths. In more than thirty per cent no recurrence took place during the period of observation.

Indications.—Hyperpyrexia baths, because of their safety and simplicity of administration, have a field of usefulness in early cases of vascular disease with symptoms of intermittent claudication. Even in the more severe cases this therapy may find a place because sympathetic ganglionectomy, as well as the use of intravenous hypertonic saline solution, is recommended chiefly in selected cases of Buerger's disease. Arteriosclerosis with calcification is infrequently benefited by the foregoing procedures, but hyperpyrexia has in our experience proved worthy of trial.

Conclusions.—Hyperpyrexia produced by baths is a useful therapeutic measure in the symptom complex of intermittent claudication.

The milder cases offer the better chances of improvement.

Cases in which gangrene has already taken place show no amelioration.

Arteriosclerosis with calcification in the peripheral vessels presents a favorable field for this therapy.

Low Back Pain. Elias Margo, M.D., Oklahoma City, in Jour. Oklahoma State Med. Assoc., xxiv:1:16, January, 1931.

This may be classified as either conservative or operative. The conservative again may be divided into recumbent and ambulatory.

The recumbent treatment is indicated in acute painful cases with or without radiating pains. The patient is placed in a bed with a non-sagging mattress and the lower limbs flexed. These are gradually extended as the muscles become relaxed.

Ambulatory Treatment.—This may follow recumbent treatment, or else is carried out in moderate acute cases; also in chronic cases without deformity. Several methods may be employed.

Strapping.—This is applied either with adhesive or moleskin plaster for immediate relief.

Belts.—For sacro-iliac sprain this is applied low and should be of a supporting nature so that the iliac crests are firmly supported or girdled.

Braces.—When the support or appliance is needed for a long period of time in chronic cases, a brace may be required.

Casts.—A plaster of paris jacket is frequently used in acute cases after the period of recumbency. It is essential in those cases where immobilization must be complete of the whole spine and pelvis.

Manipulation is indicated and chronic cases with adhesions or in those unusual ones where a sacro-iliac subluxation occurs. Again it is indicated in some persistent sacro-iliac cases with complicating sciatica where nerve stretching under anesthesia is necessary.

Physical Therapy.—Most cases of back sprain become dissatisfied because the average physician will only treat them by strapping. With physical therapeutic agents, you not only do something for the individual but when carried out properly it is our best method of relief. When prescribed, it must be carried out by a well trained technician. The usual method is heat, either infra-red or diathermy. Usually the latter is most effective, and is then followed by massage. The massage should be of a scientific nature and not a rub-down. This should be given for at least ten minutes following the application of heat. Medical gymnastics may also be indicated in subacute and chronic cases. With well-supervised physical measures, the period of disability in low back pain is greatly decreased as well as the degree of discomfort.

The Treatment of Obesity. Wm. M. Ballinger, M.D., Washington, D. C., in Southern M. J., xxiii:12:1155, December, 1930.

The practical treatment of obesity, notwithstanding the

element of endocrine dysfunction, has always been and still remains largely dietetic.

The dietetic treatment concerns itself primarily with three factors: the reduction in caloric value of the food intake; the reduction of fluid intake; the reduction or elimination of sugar and salt from the diet. In considering the first of these, the reduction of caloric intake, several items are involved. First, food fat is the most ready source of body fat and should be cut to a minimum. Second, sufficient carbohydrate must be taken to eliminate the possibility of incomplete oxidation and resulting acidosis; and, third, protein, because of its specific dynamic action, should be given in full allowance. This reduction in caloric intake may be accomplished by eliminating undesirable articles of food, such as butter, cream, potatoes, rice, and so forth, but is accomplished far better by working out a diet list of carefully measured caloric value. Briefly, this may be done by first computing the ideal weight for the individual patient in accordance with his age, height, sex and peculiar structural make-up, and, second, by estimating the normal caloric needs of such a person at that ideal weight. Practically a ready rule to follow is to give as many grams of protein as there are kilograms in the ideal weight. Give one half as many grams of fat as protein, and add sufficient grams of carbohydrate to bring the total caloric value up to the desired point.

The second consideration, the reduction in the fluid intake, though often overlooked, I consider of paramount importance. It is most easily accomplished by forbidding water at meal times and allowing not more than four ounces of fluid at the end of the meal. This works out practically, not only by limiting the fluid intake, but also by definitely decreasing the appetite, and it avoids the common practice of washing down huge amounts of food by swallows of fluid. Between meals and in the evening sufficient water may be taken to make a total twenty-four hour fluid intake not in excess of fifty or sixty ounces. That body fluids play a most important part in body weight we all know, considering the fact that by weight we are more than half fluid. By limiting fluid intake we introduce a definite and positive aid in reduction of body weight.

The third consideration, the reduction, or elimination of sugar and salt from the diet, requires but brief comment. Sugar supplies a readily oxidizable and concentrated form of food of high caloric value. It stimulates thirst, and tends to concentrate and hold fluid in the body tissues. Salt, likewise, markedly increases thirst and is primarily objectionable because high blood chlorides are associated with increased fluid retention in the body tissues. An interesting side light on this phase of fluid retention and high blood chlorides is a series of cases reported which were treated for obesity by dietetic measures supplemented by occasional injections of novasurol, and salyrgin, two of the newer mercurial diuretics whose effect is to deplete the chlorides of the body and produce great body fluid loss by diuresis.

In the general management of obesity exercise in moderation is advised. Excessive exertion elicits excessive thirst and increased appetite and nothing is gained in the long run. Hydrotherapy, in the form of hot baths, and massage in those individuals too indolent or too ill to take a moderate amount of exercise, may be recommended.

The Treatment of Common Injuries of the Knee Joint. Guy A. Caldwell, M.D., Shreveport, La., in South. M.J., xxiii:12:1114, December, 1930.

Simple strain of the lateral ligaments of the knee joint, unassociated with internal derangements, are relatively rare. Simple strains should respond in the course of a few days to relief from weight bearing by the use of crutches, partial immobilization by the application of adhesive strips or a massive dressing, followed by simple home measures of heat and massage. The patient can be directed to take a hot tub bath, to exercise the knee moderately while in the tub, and to follow the bath with gentle massage of the knee. Typical instructions for a patient with an injury of this sort would consist of the following:

Wear the adhesive stripping and massive dressing until soreness is greatly improved and there is some motion without pain; usually two to four days.

Use crutches without bearing weight on the joint until all swelling has disappeared and until there is no pain when the joint is flexed through at least 90 degrees of motion.

Upon removal of the adhesive and dressing substitute an elastic knee support and begin hot baths, followed by massage.

Continue the use of crutches, but begin light weight bearing only after tenderness over the ligament has disappeared. Progress from both crutches with light weight bearing to one crutch only, and finally to a cane. The single crutch, or cane, should be used on the opposite side from the injured knee.

Continue use of the elastic knee support for one to two weeks after full weight bearing is permitted.

The indications for treatment of injuries of the semilunar cartilages, depend upon the age of the patient, the type of lesion as best it can be determined, the question of recurrence and the severity of associated symptoms.

In cases of the initial injury, reduction of the displaced cartilage should be accomplished as soon as possible, and the patient should be put at rest with the knee splinted until the swelling has subsided, and the subsequent treatment can then follow the plan outlined for strains of the lateral ligaments. It is essential in these cases, however, to warn the patient of the possibility of recurrences and the importance of avoiding certain movements and positions which are likely to cause them. It is equally important to plan exercises for the development of the thigh and leg muscles. The best guarantee against recurrence is a strong thigh musculature, for the stability of the knee joint is dependent more upon its muscular support than upon its ligamentous support.

Torn crucial ligaments are associated only with severe injuries; are recognized by the antero-posterior instability and weakness of the knee joint and demand permanent bracing, or one of the several types of operation for reconstruction of the ligaments.

Fractures of the patella, the tibial plateaus, or femoral condyles which show displacement require operative treatment.

Some of the various measures employed in the treatment of knee injuries are worthy of further discussion. When adhesive strips are applied for partial immobilization they should extend from the upper thigh down to the lower leg, crossing just below the patella with several additional strips passing three-fourths of the way around the circumference of the joint, leaving an open space over the popliteal space. Small postage stamp applications of adhesive over the inner side of the joint are a grievous waste of good material. Strips applied to a hairy limb without first shaving it betray callous laziness on the part of the surgeon, and strips which completely encircle the leg, besides punishing the patient, display the ignorance of the physician.

Warmth is always grateful to a sore joint and the simplest way to secure it is to apply a massive dressing of cotton and gauze which prevents radiation of the body heat. Besides retaining the heat such a dressing, snugly bandaged in place over adhesive strips, has considerable value as a splint.

The importance of relieving an injured joint of its weight bearing duty cannot be over-emphasized. The steps through which a convalescing weight bearing joint should progress are generally as follows:

From absolute immobilization and rest the patient should proceed to active motion of the knee through a limited range a few times a day.

Allowing the patient up on crutches with the limb unsplinted, have him gradually increase the range of active motion.

Permit him to bear a little weight on the injured joint for a few steps and if he feels but little or no pain, he may be advised to increase gradually the amount of weight borne and the range of voluntary movements during the following days.

When the preceding steps have been accomplished without aggravating the pain, swelling or stiffness, the patient may begin to walk with the aid of a single crutch only, using it on the well side.

After a few days of using the single crutch a cane may be substituted and later it may be discarded.

During this convalescent period daily treatments of baking and massage are helpful. Skilled massage is more effective and grateful to the patient in his fight to regain joint function than all of the electric modalities combined. Too often do we find nowadays that the applications of diathermy to a joint are not followed by intelligent massage and controlled exercise. It must not be forgotten that diathermy is but another method of producing heat in the tissues and that the use of heat is but the smallest part of treatment of damaged joints. Massage, controlled exercise and rest, warm baths and psychic boosting are the chief aids to the recovery of joint use.

Braces designed to support the knee joint are generally impractical. To be effective the brace must prevent lateral and twisting movements in the knee joint, and the "knee cage" designed by Jones, and shown in the text books does not accomplish this.

Injury of the Serratus Magnus (Anterior) Muscle. Seth M. Fitchet, M.D., in N. E. J. of M., 203:17:818, October 23, 1930.

Traumatism involving the serratus magnus muscle usually produces a palsy due to concussion, compression, contusion, stretching, or laceration of the long thoracic nerve. Trauma may also produce tearing or rupture of the muscle itself either along its digitations, in the body, or at its scapular insertion. The early differentiation between a muscle injury and a nerve injury is important.

The main function of the serratus magnus muscle is to keep the scapula applied to the chest wall and to aid in rotating the scapula when the arm is elevated. Its antagonists are the trapezius, the rhomboids, and the levator scapulae. The serratus magnus is innervated by the long thoracic (the posterior thoracic nerve, the long external respiratory nerve of Bell) from the fifth, sixth and seventh cervical nerves.

Many conditions, other than trauma, have been listed as causing painful shoulders and alar scapulae: anterior poliomyelitis, cerebral palsy, progressive muscular atrophy, cervical rib, lues, neuritis, exposure to cold and wet, and inflammation associated with typhoid fever, influenza, diphtheria and erysipelas. Displacement of the scapula upward and outward may be due to partial paralysis of the trapezius when the spinal accessory nerve has been cut or injured. The most striking thing noted on physical examination is the "winged" scapula.

Treatment should first be directed to putting the part at rest. An aeroplane type of splint with the weight of the arm and shoulder supported from the pelvis, the arm slightly anterior to the mid-axillary line, gives satisfactory relaxation and support. After the acuteness has subsided, the Faradic current, gentle massage, and muscle training and reeducation are of value. The operative procedures are the last to be considered. If there is a bad deformity, suturing the latissimus dorsi over the angle of the scapula might be considered, but is, at best, only a makeshift and of value only in an attempt to reduce an accepted deformity. When the injury is primarily a nerve lesion and the residue is a complete palsy, Skillern has suggested a suture between the proximal end of a healthy nerve to the distal end of a long thoracic nerve.

The prognosis should be guarded. If the injury is to the muscle and the patient is seen early, the prognosis is fair to good for complete recovery. If not seen early, the chances for full recovery rapidly decrease. If the nerve is primarily involved, much depends on its early recognition and the extent of the anatomical lesion, the nutritional state of the paralyzed muscle, and the extent of the secondary changes in the antagonists. The nerve may be compressed, or contused, or have varying degrees of laceration. When there is complete absence of reaction of the nerve to the faradic and galvanic currents, the prognosis is bad and surgical substitution, or the training of other muscles to assume some of the functions of the serratus is indicated.

The Neurological Principles Underlying the Treatment of Muscular Atrophy. Herman Campbell Stevens, M.D., Cleveland, in Ohio State M.J., xxvii:1:35, January 1, 1931.

The traditional theory of the treatment of such a complex has been that these structures suffer by reason of inactivity and therefore they require stimulation. Hence, the classical methods of treatments have been passive motion, massage, external heat and the various modalities of the electrical current. Two of these methods, viz., massage and the galvanic current have been subjected to experimental tests under controlled conditions in such a way that their efficacy, if any, could be definitely shown in the results. The work of Hartman and his associates may be cited in this connection. The sciatic nerves of the cat were cut under sterile conditions in both legs close to the sciatic notch. In one series the muscles of one leg were treated by massage, in another series by galvanic stimulation and in a third series they received no treatment at all. The effect of the treatment was gauged by the loss of weight as the muscle undergoes atrophy or by the force evoked by direct, electrical stimulation of the muscle. The results in both cases showed no material difference between the treated and untreated, denervated muscles. The sinusoidal current was subjected to the same test and gave the same negative results. Langley working independently confirms this conclusion.

Passive motion is no doubt of value in the treatment of paralyzed limbs not because of its effect on the muscle or the nerve but by reason of its beneficial effect on the joint. The tendency of joints to become fixed as a result of muscular inactivity justifies the use of passive force to prevent the joint capsules, ligaments and tendons from becoming unyielding in one position. In view of the incessant fibrillation and the prolonged development of heat in the muscle after denervation, it is doubtful

whether the application of external heat is of any value in retarding atrophy or in accelerating recovery. No experimental evidence is available concerning this point.

A specific treatment of muscular atrophy would be one which prevented wasting and preserved unchanged the elasticity and tone of the muscle until the nerve influence was re-established. The evil effects of joint deformities and shrunken muscles could be avoided, although the paralysis would be unchanged.

In the light of this brief review of the salient physiological facts regarding muscular atrophy, let us attempt to formulate the principles upon which a sound therapy should be based.

First, it would seem to be suggested that early interference in the way of active treatment is contra-indicated. The vascular and thermal changes which go on for many days after onset, show us that the early use of infra-red and other calorigenic artifices is to be discouraged. Massage at the stage now considered is likewise for the same reason contraindicated. The muscle suffers from too much blood.

Denervated muscle by virtue of its diminished viscosity and decreased elasticity is more easily deformed by a stretching force and has less power of returning to its normal form than has normal muscle. It follows from these facts that one of the chief aims of treatment should be to prevent deformity by maintaining the member in the optimal position to prevent the stretching of the paralyzed muscles or their tendons. The optimal position is that in which opposing antagonists exert equal tension on the member. Such a position minimizes the evil consequences of paralysis rather than to cope with the cause of the condition.

In view of the fact that the muscle is in a state of prolonged fibrillary activity it follows that it requires physiological cellular, rest and not stimulation. To attain this end a search should be made for chemical or other means of checking fibrillation.

Paralysis in Children. R. G. Gordon, M.D., D.Sc., F.R.C.P.E., Physician to the Bath, Somerset, and Wiltshire Orthopedic Hospital, in the Practitioner (London), cxxv:6:709, December, 1930

The only way to deal with the subject in a short article is to tabulate the possibilities with which we may meet and discuss each.

First as to causes. These may be:

Pronatal. (a) Failure of part of the nervous system to develop properly (nonprogressive); (b) some intrauterine inflammatory or degenerative processes the nature of which is not at present understood (usually nonprogressive, rarely progressive).

Second, natal. Injury during the process of birth. (a) from tearing (nonprogressive); (b) as a result of hemorrhage (nonprogressive.)

Third, post-natal. Infections (usually nonprogressive once the acute stage has passed off).

Congenital Affections. (1) Cortex.—(a) If the congenital affection is extensive then there will be general mental deficiency which may or may not be accompanied by motor disabilities. In these cases any treatment of the paralyses is likely to be very disappointing since the child is more or less incapable of cooperation.

(b) If the motor tract, i. e., pyramidal system, is principally involved we have a condition of cerebral diplegia or Little's disease. This results in a weakness and rigidity of all four limbs, the legs being worse than the arms. This is often associated with athetotic movements—typical squirming, slow entirely involuntary movements most noticeable in limbs, lips and tongue probably due to involvement of the caudate nucleus and putamen, which prevents their normal control of the globus pallidus. Much, however, can be done for the more intelligent of these cases by careful and patient training.

Basal Ganglia—mid-brain.—There is a type of child, not so uncommon as is sometimes supposed, which has been described as a "frog baby" since the limbs are held abducted and flexed rather in the position of a squatting frog. Treatment is slow but on the whole reasonably successful in producing improvement both in posture and movement.

Cerebellum.—Congenital affections of the cerebellum are relatively common and result in reeling ataxia with hypotonia of muscles with special difficulty in maintaining the balance of the trunk on the pelvis and limbs. There is often nystagmus and dysmetria, that is, difficulty in estimating the distance of an object in reaching for it with the limbs. Treatment by re-education often produces marked improvement.

Spinal cord.—When the lateral columns of the cord are affected we find the condition known as Frederick's ataxia, which is probably congenital, although it may be comparatively late in its appearnce. The gait is similar to that of cerebellar affections, and to certain muscular atonias. Treatment may do something by re-education, but tends to be rather disappointing, and these cases do not often survive through adolescence.

INJURY

Injuries are caused to the brain either by severe compression of the head in passage through the birth canal or by the application of forceps. In a vast majority of cases the result is hemorrhage which will cause laceration or pressure on the nervous tissues. Injuries sufficiently severe as to injure the cortex as a whole and result in amentia, and in which the infant survives must be very rare.

Basal Ganglia, mid-brain.—It is difficult to be certain that these are not cases of arrested development or degenerative changes in utero.

Spinal cord (complete section).—Complete transection of the spinal cord is a serious injury which may occur from severe traction on the spine in breach cases.

Anterior horn cells.—When traction is applied to one or more limbs during delivery, the forces used may be sufficiently great to exert such strain on the cords of the great plexuses that other cells of origin in the anterior are actually avulsed, and, of course, completely destroyed. This will naturally result in a complete flaccid paralysis of the involved limb and no treatment can hope to restore movement to the muscles supplied by the axons of these cells, the only hope being to outwit the disability by some orthopedic appliance.

Peripheral Nerves.—Similar manipulations of a less severe nature result in the tearing of one or more of the cords. This is commonest when the arm is pulled upon and results in what is known as an Erb's paralysis. The prospects here are much better, for the lesion is less extensive.

Infections.—Infections are for the most part postnatal, though syphilis is an important exception to this.

Cortex.—Where the cortex as a whole is concerned we are dealing with an encephalitis, a condition very frequently fatal, but as exemplified by encephalitis lethargia as it affects children, it may result in personality changes which may lead to chronic mischievousness and delinquency.

Basal Ganglia, mid-brain.—The basal ganglia are affected by encephalitis lethargia. This results in Parkinsonian rigidity and considerable restriction of movement with or without tremor. Treatment is not satisfactory.

Spinal cord.—Complete lesions of the spinal cord are often due to syphilis and may resemble the corresponding lesions due to injury.

Anterior horn cells.—By far the commonest infection of the nervous system in children is of course acute poliomyelitis. All cases except the most trivial should be nursed on a Jones's frame for two months from the date of the initial symptoms, and when physiotherapy is started great care must be taken that progress is obtained, for many muscles lose the little power they possess as a result of early and too vigorous treatment.

Peripheral Neuritis.—Peripheral neuritis in children is most common due to the diphtheria.

TREATMENT

As to treatment of these conditions in general, perseverance, patience and discrimination are essential. Physiotherapy and re-education are the chief agencies, for as has been said above, operative procedures must not be lightly undertaken when the tissues are actively growing. Care must be taken in spastic and rigid cases not to increase the rigidity by injudicious stimuli in the form of massage and electricity, and it must be remembered that young children are often hurt and frightened by the application of electricity in any form and the loss of the confidence and cooperation of the patient far outweighs any benefit derived from the current. All forms of reeducation are helped enormously if they can be carried out in hot water in the form of a large hot pool bath, for in this medium the effects of gravity are overcome, rigid muscles are relaxed, contractions can more easily be reduced and pain is diminished.

Production of Therapeutic Fever by Diathermy. Arthur C. Jones, M.D., Portland, Oregon, in Northwest Medicine, xxix:12:370, December, 1930.

The technic of raising body temperatures with diathermy currents is chiefly concerned, first, with supplying safely a sufficient quantity of current to the patient, and, second, with reduction of heat losses to a minimum. Thus a rise of temperature is inevitable if these requirements are met. The source of current used at the University of Oregon medical school is a machine of the vario-frequency type built to give currents of sufficient volume for all ordinary diathermy treatments. King and Cocke used this type of machine for some of their work, but found that one specially built to carry heavy loads over long periods was better for the prolonged operation which is necessary when the entire body must be heated. More time is required for the general purpose diathermy apparatus to bring the temperature up to the desired maximum but its use is entirely feasible and practical.

The electrode surfaces in contact with the body must be large, and must be applied evenly to avoid concentration of the current with consequent tissue injury. Two foil electrodes, each 7x9 inches are strapped on over the ventral surfaces of the body, and exactly similar ones on the back. In cases of paresis a jacket similar to a restraining jacket may be advisable, with the electrodes mounted on the inner side. Thus the patient can move about without danger of loosening the contact with the plates and so causing concentration of the current and a burn. There is no danger of any injury to the skin, if care is used in applying these electrodes. Some workers are using oval electrodes with deep serrations about the edges which seem to function equally well. A backing of sponge rubber helps to make apposition even.

THERAPEUTIC FEVER

Encephalitis lethargia and multiple sclerosis are offering some hope of improvement with pyretotherapy. Pouppirt of San Francisco has used baths at 110 F., to increase temperatures in cases of Parkinson's Disease and concludes that these patients stand temperatures of 104 and 105 F., very well. The presenting signs of tremor, pains in the muscles, ocular crises, and stiffness are helped in nearly every case, and in a few cases are entirely done away with. Depression is lessened and the general health of these patients is improved. He uses the treatment as a particularly useful adjunct to re-education of patients with severe sequelae of encephalitis, and states that it occasionally enables them to return to useful employment when all other measures have entirely failed.

SUMMARY

High Frequency currents may be used to create any desired temperature rise within the body without danger of injury. The procedures outlined may be safely carried out in any hospital department properly equipped for the work provided the precautions suggested are observed. The advantages of this form of therapy over other types of pyretotherapy are:

Complete control of the temperature throughout the treatment, which may be given at any time and as frequently as the clinician chooses;

Normal metabolic activity of the body is stimulated by an outside source of heat;

A method of study of fever effects is offered with temperature as the only variable factor;

No foreign protein or vaccine is introduced; therefore, there is no disturbance of the immune reactions nor depletion of the complement of the blood;

The risk is much less with malarial infections, in which there are from 5 to 10 per cent deaths reported;

All patients selected may be treated. Many persons are naturally immune to malaria, and with it there is added difficulty in keeping the strain of organisms alive or of obtaining a new strain, if the original strain should be lost; This is especially an advantage where only a few patients are to be treated at a time. The means are always available;

Clinical and laboratory research may be conducted on the effects of fever in many other conditions.

The Prevention and Treatment of Laryngeal Tuberculosis. Frank R. Spencer, M.D., F.A.C.S., Boulder, Colorado, in Colorado Med., 28:1:29, January, 1931.

Prevention offers our best solution of the tuberculosis problem. The importance of avoiding the contacts which produce the infection in the lungs cannot be emphasized too much.

Next to this in importance comes early diagnosis of the pulmonary disease.

Early treatment of pulmonary tuberculosis by means of bed rest, good food, proper climate, fresh air, sunshine, etc., will often insure an early cure of the pulmonary disease and thus avoid laryngeal complications. After the disease has become well established in the lungs pneumothorax often has done much to arrest the pulmonary disease and prevent the laryngeal complications according to Dworetzky.

General heliotherapy, on account of its general tonic effect, offers a valuable remedy for the cure of pulmonary tuberculosis and the prevention of laryngeal tuberculosis. The ex-service men who have been treated systematically by general heliotherapy, and particularly by sunshine, leave the hospital with firm muscles, better weight, better resistance against acute infections and with fewer complications than patients not so treated.

When laryngeal tuberculosis becomes a reality prevention for other members of the family still offers a big field for usefulness.

Treatment must be the next important consideration for the patient. The following in the order given are important:

1. Rest of the larynx. This is just as important as bed rest for pulmonary tuberculosis. Whispering lessens the work for the larynx. Absolute silence by using a pencil and scratch pad is better if not too depressing for the patient.

2. Heliotherapy, obtained by reflecting the sunlight into the larynx by means of a Verba solar laryngoscope, offers a valuable means of direct benefit to the larynx and in addition the benefit of occupational therapy.

The ultraviolet, chemical or actinic rays may be conveniently supplied in winter, or on cloudy days, by an ultraviolet lamp with a special attachment for the larynx. There are several of these on the market.

3. Cauterization offers a very valuable means of destroying both ulcers and tubercles. It is doubtful if any single method of treatment, either medical or surgical, has yielded better results than the cautery.

Patients tolerate the galvano-cautery best if the pulmonary disease is well arrested. Patients with high fever, rapid pulse, cough, and active pulmonary and laryngeal tuberculosis are rarely, if ever, proper patients for the use of the cautery.

The cautery is not indicated, except very rarely, in acute laryngeal tuberculosis and only rarely in subacute types. The chronic type is usually the one best suited to cauterization, provided the cautery is to be used.

Infection following the use of the cautery is extremely rare. This is doubtless due to the destruction of infectious organisms by the cautery and the sealing of the lymph and blood vessels by the eschar.

Exercise in Convalescence from Pulmonary Tuberculosis. James Breslin, M.D., United States Veterans' Hospital, Castle Point, N. Y., in United States Veterans Bureau Medical Bull., 7:1:72, January, 1931.

The purpose of this paper is to describe in a systematic way the treatment and physical conditioning of patients following the time when they have completed their course of infirmary care and have been transferred to semi-ambulant or ambulant wards in preparation for final discharge.

There is probably no more frequent cause of reactivation in cases of tuberculosis than that of improperly preparing patients for discharge. The conditioning and preparing of the patient so that he will be able to carry on without relapse following discharge becomes a very important and serious problem which should be solved by:—

(a) Instituting a program of graduated exercises;
(b) A course of instructions.

Candidates for exercises may be divided into three classes:

(a) Those to be discharged as arrested, and who will be able to pursue a gainful occupation following discharge;

(b) Those who have attained a stage of sluggish quiescence, and who may to a limited extent be able to pursue a gainful occupation.

(c) Those who have made as much progress as a result of hospitalization as can be expected and cannot be expected to get an arrest or further benefit from hospital care, and who cannot pursue a gainful occupation.

A program must be developed which will take into consideration all of these conditions, and to do so the patients are subdivided into three classes which in the reverse alphabetical order, are as follows:—

(c) These are the patients who have arrived from the infirmary wards, and who, in addition to the exercises outlined as carried out in infirmary wards, are allowed to make their beds and take fifteen minutes walking exercises on level ground every morning and afternoon. The time is gradually increased to half an hour every morning and afternoon, with such recreation between rest periods as reading, writing, occupational therapy in the shop for one hour daily, card playing, checkers, etc. Also recreation hall privileges for entertainments from one to three nights a week. During this stage the patient who is not already trained to take his pulse and temperature is instructed how to do so in order that he may keep his own exercise chart.

Exercise charts are mimeographed sheets, one for the morning and another for the afternoon exercises. Each sheet is devised to cover entries for one month. They are inspected daily by the ward surgeon in charge of the exercises. At the end of the month they are filed in the patient's record file. The charts show the month and dates, the time consumed in the exercises, the kind of exercises and the pulse and respiration rates immediately before and immediately after exercise. Space is also provided for ward surgeon's notes. The full name and register number of the patient is filled in at the bottom of the chart. The kind of exercise taken is noted in the space under the caption "kind of exercise," by the following symbols: 0 no exercise; 1 occupational therapy; 2 going to mess hall; 3 preliminary 15 minutes walk; 4 hiking up to half mile; 5 hiking to one mile; 6 hiking to 2 miles or over.

(b) Here, in addition to the exercise carried out in the previous class the patients are allowed to play pool and to go more frequently to the recreation hall. Occupational therapy is allowed for one hour each morning and afternoon and the morning walk on level ground is changed to a half mile hike on the road, the afternoon exercise being continued as previously; the length of the morning hike is gradually increased as the condition of the patient will permit until a distance of two miles is attained, when he is transferred to Class a.

(a) This is the last stage of exercise before being discharged, and in consequence the patients are allowed a degree of freedom intended to stimulate the mode of life and routine which it is expected they will carry out following discharge.

A COURSE OF INSTRUCTIONS

During the time that the above exercise program is being carried out, a course of instructions is also given, including an outline of how to carry on so as to avoid the possibility of relapse. This includes the impressing upon the patients the necessity of continuing their rest period some time in the day for all time, showing them that they are limited capacity individuals who must always limit their exertions and length of time at work and play; educating them in the prevention of the spread of the disease to relatives and others; and to those who have not attained and cannot attain an arrest the imparting of such instruction as is applicable to their particular condition.

Modern Treatment of Mental Disorders in German Hospitals. Prof. M. Weygandt, Hamburg, Germany, in Am. J. Psychiat., 10:3:385, November, 1930. (Remarks made at the 86th annual meeting of the American Psychiatric Assoc., Washington, D. C., May 6, 7, 8, 9, 1930.)

Very beneficial are the permanent warm baths introduced by Prof. Kraepelin and lasting from ten to twelve hours, sometimes day and night. These contribute to soothing excitable cases, more especially in the excited

stage in manic-depressive insanity and also in cases of delirium tremens. Further, the patient's appetite improves. The bath treatment acts as a preventive against decubitus. An advanced case of decubitus is best treated by permanent bath, especially in cases of general paralysis.

Of great practical value in treatment are the lounge chairs arranged as beds in the fresh air. They soothe and improve the appetite and the blood. We often employ them until late in the winter months, November and December.

For juvenile patients, especially psychothologic and feeble minded children there are gardens close to the house, one being used as a tennis court. A special teacher for the feeble minded gives instructions for these difficult cases. There are also workshops for the children.

Nervous cases are given sun baths. For these there is also an annex for physical treatment, with gymnastic apparatus for active and passive exercises, rowing devices, bicycles, saddles for horse and camel movements. Naturally there are also artificial sun baths, diathermal apparatus with different rays, electric baths, etc.

There are certain methods of treatment which are rather difficult to demonstrate by films, for example, the fever treatment in cases of paralysis and nervous syphillis or operations on the brain.

Much more important for the curing of our patients is their employment in some form of useful occupation. For instance, our patients are put to work as tailors, as joiners, as book binders, as blacksmiths, as cobblers, as well as at weaving, lace making, mat making, etc.

Surgical Trauma and Convalescence. J. Basil Hume, M.S., Lond., F.R.C.S., Eng., Demonstrator of operative surgery, St. Bartholomews Hospital. In the Lancet, 1:1:6: Jan. 3, 1931. (An address given to the Hampstead Medical Society on Nov. 20, 1930.)

Surgery, however successful it may be from the point of view of the eradication of disease, must of necessity be associated with some injury to the patient in the process of effecting a cure. The degree of injury inflicted undoubtedly influences the rapidity of recovery, because although the wound heals and the patient leaves his bed, an interval, often a considerable one, elapses before he is able to return to work, while a still longer period elapses before he is absolutely fit again. This period of delayed convalescence is greater in women than in men, and in nervous subjects than in placid or normal ones.

Convalescence may be divided into two stages: a primary stage, extending from the time of the operation to the time when the patient begins to return to the ordinary life; and a second stage, from this time until complete fitness is attained.

Perhaps the most important factor in expediting recovery is the use of massage or bed exercises. Many patients when they have spent ten days on their backs suffer from a mild sacroilliac strain which causes an unpleasant dull pain in that region. This is almost certainly due to a straightening out of the lumbar curve. It will be avoided if the patient is nursed on the side from time to time, or if the back is massaged. A patient who has been confined to bed for sixteen days after an operation on the upper abdomen, but has had regular massage to the back and limbs, should be able to walk as soon as he puts his feet on the ground. Too many patients regard massage as a luxury that they cannot afford, but they would more than save the masseur's fee in the reduced time they would have to spend at a seaside hydro.

Registry of Biophysical Assistants. Editorial in British M.J., 3645:835, November 15, 1930.

The representative body of the British Medical Association in July, 1928, pointed out the need for the registration of competent and suitable lay persons to whom doctors could with confidence send their patients for electrical treatment and actionotherapy. In the following December the science committee presented to the council a report on the practical steps to be taken to organize courses of training in these procedures, and to prepare a roll of persons who had satisfactorily followed such courses. A small committee of experts was then formed to draft general lines of procedure, and an arrangement was entered into with the society of apothecaries of London to institute a registry of approved persons under the conditions prescribed. Regulations were drawn up and the first register of biophysical assistants was printed and published a few months ago under the direction of the Society of Apothecaries (British M.J., May 31, 1930, page 1012). This contained full details of what is required in order to become a registered biophysical assistant, a statement of the undertaking which registered persons are required to sign, and the first list of names arranged both alphabetically and topographically. At the suggestion of the Science Committee, and with the cooperation of the Society of Apothecaries, we publish in the Supplement this week, for the convenience of medical practitioners at home and abroad, the topographical part of the register of biophysical assistants revised to October 31, 1930. Those whose names appear therein have been approved as persons "competent to dispense the direct current, ionization, faradic currents, sinusoidal currents, diathermy, high frequency currents, light and heat, and ultraviolet light."

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